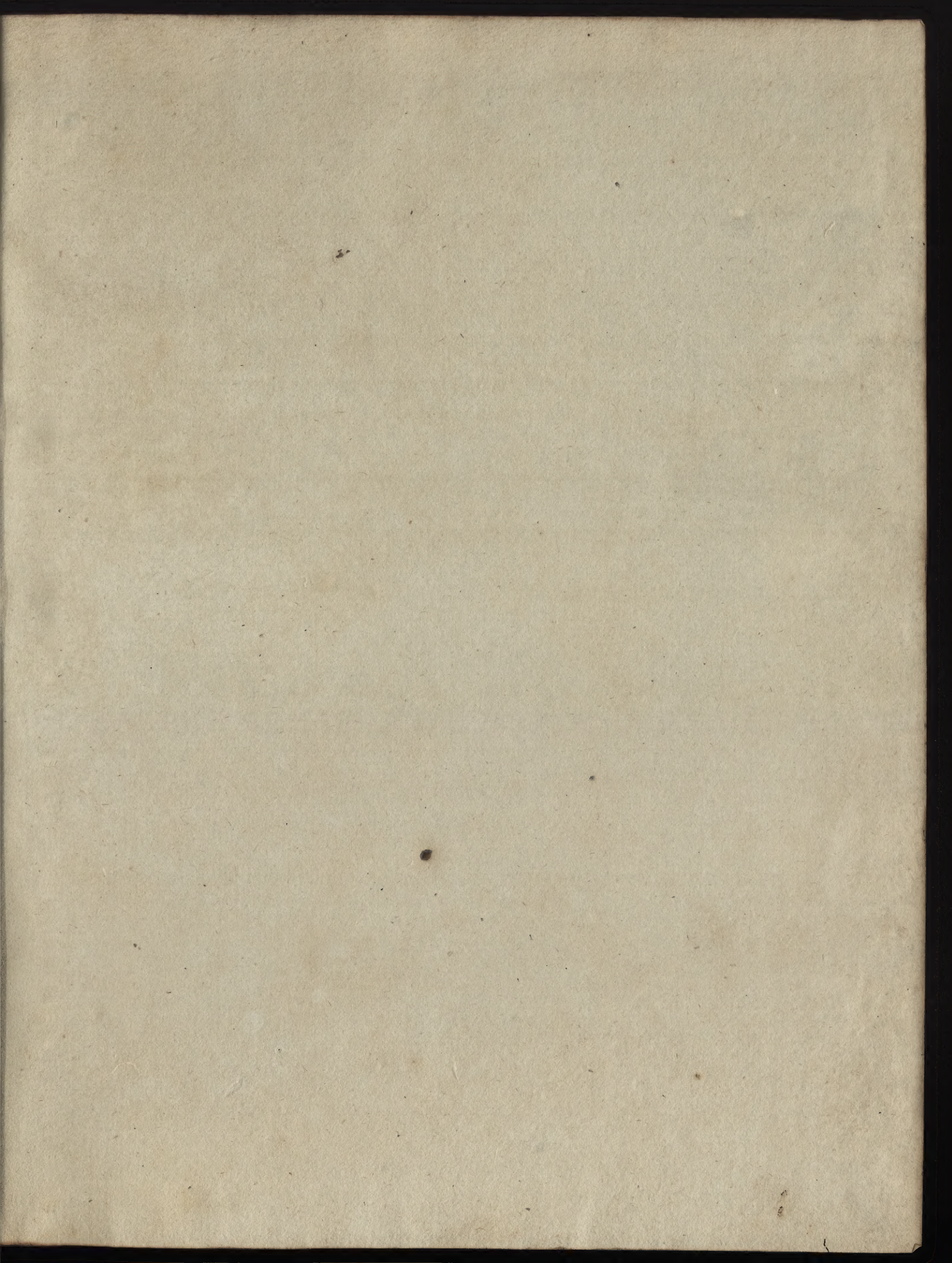
The background of the image is a complex marbled paper pattern. It features large, irregular, dark blue or black blotches that contain a dense, stippled texture of white and light grey. These blotches are separated by thin, flowing veins of yellow, red, and green. The overall effect is a rich, organic, and somewhat chaotic visual texture. A small, rectangular, cream-colored paper label is pasted onto the center of the marbled paper. The label has slightly irregular edges, suggesting it was hand-cut or is a remnant of a larger piece of paper. It contains three lines of text in a black, serif typeface. The text is centered on the label and reads: "G. Wells, Esq.,", "West Stockwith,", and "Gainsboro'.".

G. Wells, Esq.,
West Stockwith,
Gainsboro'.



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VOL. VII.

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E T M

ETHIOPS, ANTIMONIAL, MARTIAL, and MINERAL.
See PHARMACY-Index.

Ethiops
||
Etmuller.

ETHMOIDES, in anatomy, a bone situated in the middle of the basis of the forehead or os frontis, and at the top of the root of the nose, filling almost the whole cavity of the nostrils. It has its name from *ἔθμος cribrum*, "sieve," and *ἴδος* "form," because all spongy and porous. See ANATOMY, n° 17.

ETHNARCHA, **ETHNARCH**, (formed of *ἔθνος* nation, and *αρχή* command), a governor or ruler of a nation.

There are some medals of Herod I. surnamed the Great, on one side whereof is found *Ἡρῶδης*, and on the other *Εὐναρχου*, q. d. *Herod the Ethnarch*. After the battle of Philippi, we read that Antony, passing over into Syria, constituted Herod and Phasael his brother tetrarchs, and in that quality committed to them the administration of the affairs of Judea. (Jof. Ant. lib. xiv. cap. 23.) Herod therefore had the government of the province before ever the Parthians entered Syria, or before Antigonus's invasion, which did not happen till six or seven years after Herod was commander in Galilee. (Jof. lib. xiv. cap. 24, 25.) Consequently Herod was then truly ethnarch, for he can be no otherwise denominated; so that it must have been in that space of time that the medals were struck, which only give him this title: which medals are a confirmation of what we read in history of the government which that prince was intrusted with before he was raised to the royalty.

Josephus gives Herod the appellation of *tetrarch* in lieu of that of *ethnarch*; but the two terms come so near to each other, that it is easy to confound them together.

Though Herod the Great left by will to Archelaus all Judea, Samaria, and Idumea, yet Josephus tells us he was then only called *ethnarch*.

ETHNOPHRONES, in antiquity, a sect of heretics in the seventh century, who made a profession of Christianity, but joined thereto all the ceremonies and follies of paganism, as judicial astrology, sortileges, auguries, and other divinations.

ETIQUETTE, a French term, primarily denoting a ticket or title affixed to a bag or bundle of papers, expressing its contents. It is also used, when applied to the Spanish and some other courts, to signify a particular account of what is to be done daily in the king's household, and in the chief ceremonies relating to it. It likewise denotes those forms that regulate the decorum of conduct towards persons of various ranks and stations.

ETMULLER (Michael), a most eminent physician.

VOL. VII. Part I.

E T N

cian, born at Leipzig in 1646. After having travelled through the greatest part of Europe, he became professor of botany, chemistry, and anatomy, at Leipzig; where he died in 1683. He was a very voluminous writer; his works making no less than 5 vols folio, as printed at Naples in 1728. His son Michael Ernest Etmuller was also an ingenious physician, who published several pieces, and died in 1732.

Etna.

ETNA, or **ÆTNA**, a famous burning mountain of Sicily, and the largest in Europe; of which an account has been already given under the latter spelling **ÆTNA**. The following additional particulars relating to the eruptions, size, scenery, and products, of this celebrated volcano, are collected from the *Voyage Pittoresque* of M. Houel, who appears to have surveyed it, with greater accuracy than any former traveller.

The form of mount Etna is that of a cone, very broad at the base, which is more than 40 miles in circumference. From the bottom you ascend ten leagues before reaching its summit on the south side; and on any of the other sides, the way being not so straight, would be considerably longer. Etna is entirely composed of substances that have been discharged from the volcano in its various explosions.

It appears from the quantities of marine bodies deposited all over the under part of Etna, that it must have been once covered by the sea to at least one half of its present height. The whole island of Sicily, and the greatest part of mount Etna, have been, in our author's opinion, formed under water. But the period when the eruptions from this volcano first commenced, the manner in which the sea subsided, and the precise time at which it fell so low as its present level on the shores of Sicily, are facts concerning of which we have no certain knowledge.

The general principle, however, M. Houel thinks may be regarded as undeniable. When this mountain stood half under water, the currents of the ocean would gradually accumulate upon it large masses, both of its own productions, such as shells, and bones of fishes, and of various other matters, which would be intermixed with the volcanic matters discharged from the focus of the burning mount. In a long series of ages these strata of heterogeneous matters would naturally become so considerable as to form the enormous mass of mountains with which the volcano is now surrounded. The currents of the ocean might often convey the volcanic matters to a considerable distance from the volcanic focus. And there are mountains at no small distance from Etna, which seem to have been produced in this manner. Those of Carlitini, at the distance of 15 leagues, consist chiefly

A

of

Etna.

of a mixture of pozzolana with calcareous matters. At Lintini, and in places around it, there are distinct beds of pozzolana, scoriae, and real lava, as well as others in which all these matters are blended together in a mass of calcareous matter. At Palazzolo, about 24 miles from the city of Syracuse, the sides of the hills having been cut by the streams which run down them, in many places to a considerable depth, display huge masses of lava, and extensive beds of pozzolana. In the neighbourhood of Noto there are also volcanic productions to be found.

At Pachino, where the island of Sicily forms an angle, there are a range of hills extending for several miles, which consist all of pozzolana.

The province of Val de Noto is more homogeneous in the matters of which its soil consists, than the two other dales of Sicily. These, in every hill which they contain, exhibit a vast variety of different matters. So amazing, indeed, is that variety, that they may be considered as exhibiting a collection of specimens of all the different materials which enter into the composition of the globe. In those two dales few volcanic productions have been yet observed. But it is not to be inferred for this reason, that they contain but few. They may be hereafter discovered in great plenty. In the volcano of water at Maccalubbe, between Aragona and Girginti; in the baths of Castellamare, near Alcamo and Segeste; in the baths of Termini, in the isles of Lipari; in the hot waters of Ali, between Messina and Taormina, by the lake in the valley of Caltagirone; in all these places, which comprehend the whole circumference of Sicily, the influence of the volcano of Etna is, in some measure, felt. Nay, it would even seem, that in these places there are so many volcanic craters. All of these are so disposed as to show that they existed prior not only to the volcanic matters, but to the other substances intermixed with them.

The waters of the sea have, in former times, risen much higher than at present. But how they retreated, or whether they are to continue stationary at their present height, we know not. For more than 2000 years, during which Sicily has been inhabited, and has had cities and harbours, the sea has not been observed either to recede or encroach in any considerable degree.

When the sea subsided from mount Etna, the mountain must have been covered over with such matters as the sea usually deposits; consequently with calcareous matters. A part of those matters would be indurated by the action of the atmosphere, while the rest would be carried down by the rain-waters, and again conveyed into the ocean. The torrents of rain-water which pour down the sides of mount Etna have furrowed its sides, by cutting out for themselves channels; and they have removed from its summit, and are still removing to a farther distance, all the extraneous bodies upon it. In many places, they flow at present over a channel of lava, having cut through all the matters which lay above it: still, however, there remain in many places both calcareous matter and other marine productions, which show that this volcano has been once covered by the waters of the ocean. But these are daily wasting away; not only the rains, but

men likewise, who carry them off as materials for lime and for building, conspire to deface them.

No fewer than 77 cities, towns, and villages, are scattered over the sides of Etna. They are most numerous on the south side, where the temperature of the air is milder than on the north. Reckoning those cities, towns, and villages, one with another, to contain each 1200 or 1500 souls, the whole number of the inhabitants of mount Etna will then be 92,400, or 115,500. But it is certainly much more considerable.

On plate CLXXXIV. is exhibited a view of the Fig. 1. north-east side of the mountain, taken at sea. The lower part presents to the eye very extensive plains entirely covered with lava of different thickness, on which vegetation has not yet made any progress. The nearer the shore the more barren is the ground; while the fertility of the soil increases as we advance farther inwards. The mountain is every where full of vast excavations; which our author considers as a proof, that instead of increasing in bulk, it is actually in a state of decay and diminution. The vast torrents of lava, which overspread the sides of it from time to time, he considers as insufficient to repair the waste occasioned by rains, rivulets, and torrents flowing down from the summit. Unless the eruptions, therefore, become more frequent than they have been for some time past, he supposes that, by degrees, the height of the mountain must be reduced to that of the surrounding beds of lava. He had not an opportunity of measuring the altitude of Etna himself; but he observes that it had been done by the celebrated M. de Saussure, who found the elevation to be 10,036 feet. This was done on the 5th of June 1773, at 20 minutes after seven in the morning. The height of the barometer on the most elevated part at the brink of the crater was 18 inches $11\frac{1}{2}$ lines; which, by the necessary corrections, is reduced to 18 inches $10\frac{1}{2}$ lines. At the same time the mercury at Catania, placed only one foot above the level of the sea, stood at 28 inches $2\frac{1}{8}$ lines; which must be reduced to 28 inches $1\frac{3}{8}$ lines, on account of the necessary corrections for the thermometer. 2 Account of the north-east side of the mountain.

From Giana our author had an opportunity of contemplating the vast number of calcareous mounts scattered over that part of Etna; which (he says) "are nothing more than fragments, the slender remains of those enormous masses which have been deposited all around the base of mount Etna; and are a very curious monument of the revolutions which this mountain has undergone." They are of a true calcareous nature; and the inhabitants are accustomed to supply themselves with limestone from them. They also use the stones of which these mounts are composed for the purposes of building; as the lava is so hard that it cannot be cut without the greatest difficulty, and they have no other stone in these parts. 3 Supposed to be in a state of decay.

Leaving this place, our author travelled over several extensive plains of lava, covered on each side of the way with stunted trees, but without any cultivation; the lava being of that kind which is very unfavourable to the growth of vegetables. Arriving at St Leonardo, he observed the course of the eruption of water in 1755, and which is mentioned under the former article *ÆTNA*. 4 This Saussure's account of the height of Etna.

This

Etna.
6
Particular
account of
the eruption of water in 1755.

This water took its course down the west side of the mountain; and the channel which it cut for itself is still visible. The eruption of water from burning mountains is still much less frequent than that of lava or half vitrified solid matters, ashes, &c. though that of water, and even mixed with the shells of marine animals (though we are not told whether it was salt or not), has sometimes been observed in other volcanoes, particularly Vesuvius. The eruption we now speak of happened in the month of February 1775. It was preceded by an exceedingly thick black smoke issuing from the crater, intermixed with flashes of fire. This smoke gradually became thicker, and the bursts of flame more frequent. Earthquakes and subterraneous thunder convulsed the mountain, and struck the inhabitants of the adjacent parts with the utmost terror. On Sunday, the second of March, the mountain was seen to emit a huge column of smoke exceedingly dense and black, with a dreadful noise in the bowels of the earth, accompanied also with violent flashes of lightning. From time to time there were loud cracks, like the explosions of cannon; the mountain appeared to shake from its foundations; the air on that side next Mafcali became very dark, and loud peals of thunder were heard. These seemed to issue from two caverns, considerably below the summit, on the side of the mountain, and were accompanied with violent blasts of wind like a tempest.

These terrible phenomena continued and increased; Etna seemed ready to swallow up at once all those materials which it had been for so many years disgorging, or rather about to sink at once into the bowels of the earth from whence it appeared to have been elevated. The prospect was far beyond any idea that can be given by description of this tremendous scene. The inhabitants were alarmed beyond measure; the sight of the flames driven by the wind against the sides of the mountain, the shocks of the earthquake, and the fall of rocks, struck the imagination with a horror not to be conceived. During this dreadful commotion an immense torrent of water was emitted from the highest crater of the mountain. The whole summit of Etna was at that time covered with a thick coating of snow. Through this the boiling water directed its course eastward; and, in its passage, met with frightful precipices. Over these it dashed with the utmost violence, adding its tremendous roaring to the complicated horrors of this awful scene. The snow, melting instantaneously as the boiling torrent advanced, increased its destructive power by augmenting its quantity, while the mischievous effects of the heat were scarce diminished by reason of the immense quantity of boiling liquid which continued to pour from the summit of the mountain.

This boiling torrent having dashed its awful cataracts from one chain of rocks to another, at length reached the cultivated plains, which it overflowed for a number of miles. Here it divided itself into several branches, forming as many deep and rapid rivers; which, after several other subdivisions, discharged themselves into the sea.

Though the mountain continued to discharge water in this manner only for half an hour, the ravages of it were very terrible. Not only those of common inundations, such as tearing up trees, hurrying along

rocks and large stones, took place here, but the still more dreadful effects of boiling water were felt. Every cultivated spot was laid waste, and every thing touched by it was destroyed. Even those who were placed beyond the reach of the torrent; beheld with inexpressible horror the destruction occasioned by it; and though the alarming noises which had so long issued from the mountain now ceased in a great measure, the shocks of earthquakes, and the violent smoke which continued to issue from the mountain, showed that the danger was not over. Two new openings were now observed, and two torrents of lava began to make their way through the snow.

On the 7th of March a dreadful noise was again heard in the bowels of the mountain, and a new column of very thick and black smoke began to issue from it. A horrid explosion of small stones succeeded; some of which were carried as far as the hills of Mafcali, and great quantities of black sand to Messina, and even quite over the strait to Reggio in Calabria. On the shifting of the wind to the northward this sand reached as far as the plains of Agosta. Two days after the mountain opened again, and a new torrent of lava was discharged; which, however, advanced very slowly towards the plain, moving only at the rate of a mile in a day. It continued to flow in this manner for six days, when every thing appeared so quiet, that the Canon Recupero set out to view the changes which had taken place.

That gentleman's design was to trace the course of the dreadful torrent of water above mentioned. This he was very easily enabled to do by the ravages it had made; and, by following the channel it had cut all the way from the sea to the summit of the volcano, he found that this immense quantity of water had issued from the very bowels of the mountain. After issuing from the crater, and increasing its stream by passing through and melting the snow which lay immediately below the summit, it destroyed in an instant a fine and extensive forest of fir-trees. All of these were torn up by the violence of the current, though many were no less than 24 or 30 inches in diameter. He observed that the great stream had, in its descent, divided itself into four branches; and these had again subdivided themselves into several smaller ones, easily distinguishable by the quantity of sand they had deposited. Afterwards reuniting their streams, they formed many islands, and rivers 900 feet in breadth, and of a depth which could not easily be determined. Proceeding farther down, and still forcing its way among the beds of old lava, the channel of the waters was widened to 1500 feet, until it was again contracted in the valleys as before. Every object which stood in the way of this tremendous torrent was moved from its place. Enormous rocks were not only hurried down, but several of them moved to more elevated situations than those they formerly occupied. Whole hills of lava had been removed and broken to pieces, and their fragments scattered along the course of the river, and the valleys were filled up by vast quantities of sand which the waters had deposited. Our author observed, that even at the time he visited the mountain, about 10 years after the eruption, the whole side of it still bore the marks of this deluge.

On M. Houel's arrival at Jaci Catena, he inquired

Etna

7.
Course of
the torrent
traced by
Recupero.

⁸ ^{Etna.} for the physician of the place; it being customary for strangers to do so who want to learn any thing concerning the curiosities of the country, as the physicians there are generally those who have any pretensions to literature. By this guide he was shown a well which they call *Holy Water*. There is a slight of steps from the surface of the ground to that of the water. The well itself is 20 feet wide and 40 feet deep. It is supplied by three different springs, each of which is said to have a peculiar taste. The physician informed our author, that one of them resembled milk in its taste; another tasted like soap; and the third had the taste of common water: but our author, after tasting each of them, could not find any remarkable difference.

⁹ ^{Ancient} In his way to La Trizza, our author discovered some very ancient baths with stoves. They had been built here on account of a spring of warm sulphureous water, supposed to be excellent for the cure of cutaneous disorders; and for which purpose they are still made use of. They are now called the *Springs of St Venera*, of whom there is an image here. The fountain from which they flow is on a level with the surface of the ground. The water tastes very disagreeably of sulphur; and deposits a quantity of white impalpable powder, adhering to herbs and stones, over which it passes. This substance our author calls the *cream of sulphur*; though it is probably a selenitic substance formed by the decomposition of the sulphur, and the union of its acid with some calcareous matter which held it in solution before.

¹⁰ ^{Springs of} From this place our author proceeded to the sea-port of Trizza, a small place, which with the adjacent country contains only about 300 inhabitants. Off the harbour of this place is a basaltic rock, which seems to be only the remains of a much larger one destroyed by the action of the air. All around are long ranges of basaltic rocks, the species of which are very various.

¹¹ ^{Basaltic} The rocks of the Cyclops stand round the small harbour of La Trizza; and from this view we perceive a number of rocks of very different heights. All of them appear more or less above water, though some are so low that they cannot be seen without approaching very near; and this circumstance renders the harbour inaccessible to vessels of any considerable burden, at the same time that, by reason of the depth of the sea, it is impossible either to cut or unite them by a mole. The principal of these rocks is the extremity of an island, one half of which is composed of lava placed on a basaltic base; over this is a crust of pozzolano, combined with a kind of white calcareous matter of a pretty hard and compact consistence; and which, by the action of the air, assumes the appearance of knotty porous wood. On this subject our author observes, that "the rock, at some former period, had become so hard as to split, and the clefts were then filled up with a very hard matter which was porous on all sides like scoriz. That matter afterwards split also; leaving large interstices, which in their turn have been filled up with a kind of compound yellow matter. The island appears to have been formerly inhabited, but is at present destitute both of inhabitants and of culture, only the people of La Trizza feed a few goats upon it."

To the southward of the harbour of La Trizza we

observe several fragments of basaltic, both in the form of needles and in that of prismatic columns of a very regular form, and which may be easily separated from one another. From the position in which these fragments are disposed, it appears that the mass to which they belong must have suffered some very violent shock; otherwise such huge rocks could never have been broken, overturned, and scattered in directions so very different from their original positions. In one of these ruins there are some parts harder than the rest, which withstand the action of the air, while the intervening spaces yield to it, and appear to be thus destroyed. In some others this effect is much more remarkable; because the column happens to be much farther advanced towards a state of dissolution, the parts of which they consist being already disjointed; and in each of those which project we perceive a fissure: which shows that each of these parts may be divided into two. "They are indeed (says our author) actually divided, and display a convexity issuing from a concavity, like a pile of hats placed one upon another, when they are removed one by one; which is a very curious singularity."

¹² ^{Promontory of the} Continuing his journey still southward, our author arrived at the promontory of the Castel d'Aci. This is the most singularly curious of all that are in the neighbourhood of Etna. The ancient mass of it is inclosed between two bodies of lava of a more modern origin. These compose the rocks on which Castel d'Aci is situated, and which lie under the soil of the adjacent country. Beyond that city are the immense plains of the lower part of Etna. These gradually rise till they reach the summit, which is hid among the clouds. The promontory is almost entirely composed of basaltic, the interstices of which are filled up with a yellowish matter, which seems to be a clay nearly of the same nature with that formerly taken notice of in the island of La Trizza. It also covers the mass of basaltic, and has produced both the superior and anterior parts of the promontory. Here our author saw a number of women employed in washing webs of cloth in the sea; and takes notice of the dexterous method they have of lifting it up in folds, and packing it on their heads in bundles without receiving any assistance. At the foot of this promontory are many curious basaltic rocks.

¹³ ^{Great quantity of} All along the eastern side of Mount Etna the soil is broken, but filled with beautiful varieties of basaltic, highly worthy of observation. Indeed, according to our author's opinion; there is no volcano in Europe so rich as Etna in basaltic, nor where so many curious figures of it are to be seen.

¹⁴ ^{Mr Houel's} Mr Houel having spent some more time in visiting the basaltic columns around the foot of the mountain, set out from Aci to visit the famous chestnut-tree, mentioned under the article *Ætna*, and which is known in that country by the name of *The chestnut-tree for an hundred horses*. In his way thither he passed through the villages of Fortezza, Mangamo, St Leonardo, St Matteo, and La Macchia. The landscapes of each of these places by itself are extremely beautiful; but the country between them is a frightful wild desert, presenting to the eye nothing but extensive plains of black lava, which at a distance have the appearance of vast quantities of pit-coal. The roads became rougher as they

⁸ ^{Account of} a remarkable well.

⁹ ^{Ancient} baths discovered.

¹⁰ ^{Springs of} St Venera.

¹¹ ^{Basaltic} rocks about Trizza.

¹² ^{Rocks of} the Cyclops.

^{Etna.} Different kinds of basaltic.

¹⁴ ^{Promontory of the} Castel d'Aci described.

¹⁵ ^{Great quantity of} basaltic found on Etna.

¹⁶ ^{Mr Houel's} journey to the great chestnut-tree.

Etna. they advanced; but the adjoining fields assumed a more smiling aspect. The reason of this is, that the torrents of lava (by which the plains are rendered unfit for vegetation for a great number of years) have rolled rapidly down the more steep sides of the mountain without destroying the fertility of the soil.

17 Travelling through very difficult roads, and often incommoded with dangerous precipices, our author at last arrived at the celebrated chestnut-tree, which was the chief object of this journey. He observes, that all over this side of the mountain the chestnut-trees thrive very well, and are carefully cultivated by the inhabitants. They are worked into hoops for caske, and a considerable trade is carried on in this article. The great one which he came to visit, exceeds the size of other trees so much that it cannot fail to excite the greatest admiration. It has its name from the following circumstance. Jean of Arragon spent some time in Sicily on her way from Spain to Naples: While here, she visited Mount Etna, attended by her principal nobility; and happening to be overtaken by a storm, they took shelter under this tree, whose branches were sufficiently extensive to cover them all. By others, however, this story is treated as a mere fable.

18 According to our author's account, this chestnut tree is 160 feet in circumference, but quite hollow within: which, however, affects not its verdure; for the chestnut tree, like the willow, depends upon its bark for subsistence, and by age loses its internal part. As the cavity of this enormous mass is very considerable, the people have built an house in it, where they have an oven for drying nuts, almonds, and chestnuts, &c. of which they make conserves. They frequently supply themselves with wood from the tree which incircles their house, so that it seems likely, in a short time, to go to ruin through the ingratitude and thoughtlessness of its inhabitants.

19 It has been thought that this tree was composed of a number of others grown together; but our author is of a different opinion. In describing it particularly, however, we must separate it from the trunks *i, l, l* (on the plan), which properly belong to three other trees. The dotted line, and the letters *a, b, c, d, e, f, g*, mark out the true circumference of the tree we speak of. The parts of that circumference are not all contiguous, several pieces having been taken away from the places marked *g* and *n*, between which the house stands. In other places the bark is rent asunder; but, says our author, "by a natural motion, the divided parts, seeking to reunite, or rather to shelter themselves from the action of the external air, are bent inwards so as to form the circular arcs *a, b, c, d*, which may indeed be taken for so many different trees, though they appear properly to belong to the same trunk."

20 Besides this, there are abundance of other trees in the neighbourhood very remarkable for their size. Our traveller was shown a number of young trees of the same species, all very beautiful and straight, and almost as smooth as polished marble. One of these was 38 feet in circumference, and there were a number of others nearly of the same size. Among these there were seven standing together, which have received the name of the *seven brethren*. Another is denominated *the ship*, from the general figure of its top,

which has some slight resemblance to a ship. Its diameter is 25 feet, so that the circumference cannot be less than 75. In these extensive forests, however, there are chestnut trees of every age and size.

22 Our author's next visit was paid to a snow grotto, being one of those magazines where that article, so necessary in the hot climate of Sicily, is preserved for use. In his way thither he visited the forest of pines; which is so much surrounded by rocks and precipices, that it is scarce accessible; and vast numbers of the trees are dying of old age. Some of the neighbouring peasants, however, will now and then attempt to carry them off. Our author saw one of them at this work. It was drawn by oxen, who were yoked to it by a chain connected with the beam by an iron cramp. But the extreme roughness of the road made the tree leap and bound in such a manner, that the poor creatures were every moment in danger of having their legs broken, or being hurried over precipices along with their driver; accidents which happen not unfrequently, and which render this occupation less generally practised than otherwise it would be.

The snow grotto is but lately formed by the action of the waters under the beds of lava, and carrying away the stratum of pozzolana below them. It is situated on a mount named *Finocchio*, which, though of very considerable size, is only a protuberance on the side of Etna. It has been repaired in the inside at the expense of the knights of Malta, who have hired this as well as several other caverns in the mountain for the purpose of holding snow, which they have still more occasion for in their island than the inhabitants of Sicily. There are two openings above, at which they throw in the snow; and flights of steps have been cut to these as well as in the internal parts. A considerable extent of ground is levelled and inclosed with high walls above the grotto; so that when the wind, which at this elevation blows with great violence, carries the snow down from the higher parts of the mountain, it is stopped and detained by the walls of this inclosure. It is then thrown into the grotto, where the thickness of the beds of lava which cover it prevents any impression from the summer-heat. When the season for exportation comes on, the snow is put into large bags, and pressed into them as close as possible. Thus it is rendered compact and heavy, and likewise runs less risk of being affected by the heat. It is then carried out upon mens shoulders, and conveyed to the shore on mules. Before it is put into the bags, the lumps of snow are carefully wrapped up in leaves, which is another preservative; at the same time that the fresh congelation of the little which melts, unites the masses so together, that our author informs us he has seen pieces of the snow preserved in this manner which looked like the fairest and most transparent crystal.

24 Our author's next excursion was to Mount Rosso, or the Red Mountain, which is one of the mouths of Etna, and through which it discharges from time to time great quantities of lava, sand, ashes, &c. It is the most celebrated of all the numerous mouths which have opened on the side of the mountain, though it has become so noted only for having poured forth the matter of the great eruption in 1669, and which is the most remarkable of any recorded in history.

"When a new crater (says our author) is formed

Etna.

23 Snow grotto to described.

23 Forest of pines in the way to it.

24 How the snow is preserved from melting during exportation.

25 Account of mount Rosso.

Etna.
26
New craters how formed.

on mount Etna, it is always in consequence of some shock that is powerful enough to break the arches of its caverns. Doubtless it is inconceivable that there should be any agent endowed with such force; but when such a fracture is once made, it is necessarily very large, and the surface of the ground above cannot but be broken in several different places at considerable distances from one another. The matter which is discharged always issues from the principal opening and those adjoining to it. None of these mouths, however, continue open, excepting that which is directly in the line in which the matter is discharged; the lava soon choking up those which are in a more oblique direction."

Our author went down one of these openings with torches; but could not reach the bottom, and was obliged to return on account of the extreme cold. The descent was extremely difficult, and became more so in proportion as he advanced. This crater is of an oval form, and the opening through which he descended was in one extremity: but he was tempted to think that the crater which rises above it had been formed of matter discharged by another mouth; or perhaps it might have had a more central opening, through which the stones, sand, &c. which form the crater, were discharged.

Four of the mouths of this mount appear to be composed of a reddish pozzolano, which has procured it the name of the *Red Mountain*; but when we ascend the pyramids, or rather funnels which they form, we find them composed of different coloured layers of sand. Some of these are of a bluish grey colour, others of a fine yellow, and some of a kind of green formed by a mixture of grey and yellow, while others are of a red colour. A great number of small crystals, black schoerls, and granites, are found among them, as well as pieces of scoria, which had been discharged by the volcano in the form of a thick and glutinous matter. All these mouths have internally the form of a funnel, and their shape is nearly that of a mutilated cone or round pyramid. This is the natural and unavoidable consequence of the perpendicular fall of the pulverised matter which the volcano discharges from the orifice at the bottom. The sides of the craters are not all of one height; the parts to the east and west being considerably higher than the intermediate summits, because the currents of the ashes passed alternately from east to west, and fell upon these sides in greater quantities than on the others; which circumstance has given to this volcano the appearance of having two summits.

27
Convent of Nicolosi described.
M. Houel, having finished his observations on Monte Rosso, returned to the convent of Nicolosi, which is now only a house for the entertainment of travellers. The Benedictines of Catana, to whom it belongs, visit this place only when in an ill state of health, as the purity of the air renders it very salutary to the human constitution. A solitary brother, however, resides here to take care of the house, and to superintend the cultivation of the neighbouring plains. Those fathers once possessed an extensive and very fertile tract of land in this neighbourhood; but the eruptions of Etna have rendered it totally incapable of cultivation. This house stands at a very considerable height, being no less than 2496 feet above the level of the sea. Setting out from this place three hours before day, our

traveller directed his course towards the grotto of the goats. In his way thither, he passed over several plains of lava, some of them ancient and others more modern: but the roads were extremely rough and dangerous; or rather, as our author expresses himself, there was no track or path meriting the name of a road. In two hours they reached the Regione Sylvestra, where an immense forest surrounds the mountain, and which has undoubtedly been planted by the hand of nature: for the ground there is so high, so full of precipices, and so entirely uninhabitable, that no human being could ever think of making plantations on it; nor is it to be supposed that the winds could take up seeds from the plains to sow them on such a lofty situation.

These majestic forests of Etna afford a singular spectacle, and bear no resemblance to those of other countries. Their verdure is more lively, and the trees of which they consist are of a greater height. These advantages they owe to the soil whereon they grow; for the soil produced by volcanoes is particularly favourable to vegetation, and every species of plants grows here with great luxuriance. In several places where we can view their interior parts, the most enchanting prospects are displayed. The hawthorn trees are of an immense size. Our author saw several of them of a regular form, and which he was almost tempted to take for large orange-trees cut artificially into the figures they represented. The beeches appear like as many ramified pillars, and the tufted branches of the oak like close bushes impenetrable to the rays of the sun. The appearance of the woods in general is exceedingly picturesque, both by reason of the great number and variety of the trees, and the inequality of the ground, which makes them rise like the seats in an amphitheatre, one row above another; disposing them also in groups and glades, so that their appearance changes to the eye at every step: and this variety is augmented by accidental circumstances, as the situation of young trees among others venerable for their antiquity; the effects of storms, which have often over-turned large trees, while stems shooting up from their roots, like the Lernaean hydra, show a number of heads newly sprung to make up that which was cut off.

31
Grotto of the goats, how formed.
About three hours after the departure of our travellers from St Nicholas, they reached the grotto of the goats. It is formed by a bed of lava, which having flowed over a pile of sand and pozzolana while in a fluid state, settled and cooled in that situation; and the sand or pozzolana being afterwards carried off by the filtration of water through the lava, a void space has been left, which the torrents have gradually enlarged to its present size.

This grotto stands about 5054 feet above the level of the sea, according to the calculations of M. de Saussure. It affords a retreat for those travellers who visit the summit of Etna, who generally refresh themselves by taking a repast and making a fire at the entry, for which there is plenty of dry wood at hand; while the sand serves for a bed to repose on. Here our author and his company supped, and about midnight set off for the summit. They had the advantage of the moon-light; and our author advises all those who intend to visit the top of Etna to take such a time for their journey as may enable them to enjoy this advantage.

Etna. tage. As they advanced beyond the grotto of the goats, the trees became gradually thinner. In a short time they were so thin, that they might readily be counted; and, proceeding still farther, only a very few were seen scattered here and there, whose beauty and size were diminished seemingly in proportion to their numbers. A few clumps of trees and some tufts of odoriferous herbs were now only to be seen; and in a little time these also became thinner, assuming a withered or stunted appearance. Then they are nothing but the languishing remains of an abortive vegetation; and a few paces further not even this appeared, the eye being presented only with barren sand.

32 Account of the highest parts of Etna.

33 Snowy and barren region described.

34 Plain on the summit of Etna.

35 Wind excessive y violent here.

37 Extensive and glorious prospect from the summit.

na made it catch the first rays of the sun's light, whose vast splendor, while it dazzled the eyes, diffused a most cherishing and enlivening heat, reviving the spirits, and diffusing a pleasant sensation throughout the soul. But though the heavens were thus enlightened, the sea still retained its dark azure, and the fields and forests did not yet reflect the rays of the sun. The gradual rising of this luminary, however, soon diffused his light over the hills which lie below the peak of Etna. This last stood like an island in the midst of the ocean, with luminous points every moment multiplying around, and spreading over a wider extent with the greatest rapidity. It was as if the universe had been observed suddenly springing from the night of non-existence. The tall forests, the lofty hills, and extensive plains of Etna, now presented themselves to view. Its base, the vast tracts of level ground which lie adjacent, the cities of Sicily, its parched shores, with the dashing waves and vast expanse of the ocean, gradually presented themselves, while some fleeting vapours, which moved swiftly before the wind, sometimes veiled part of this vast and magnificent prospect." In a short time every thing was displayed so distinctly, that they could plainly recognize all those places with which they were before acquainted. On the south were seen the hills of Camerata and Trapani; on the north, the mounts Pelegrino and Thermini, with the celebrated Enna once crowned with the temples of Ceres and Proserpine. Among these mountains were seen a great many rivers running down, and appearing like as many lines of glittering silver winding through a variety of rich and fertile fields, washing the walls of 20 cities, while their banks were otherwise filled with villages, hamlets, &c. rising among the ruins of the most illustrious republics of antiquity. On the south and north were observed the rivers which bound by their course the vast base of mount Etna, and afford a delightful prospect to the eye; while at a much greater distance were seen the isles of Lipari, Alicudi, Felicicide, Parinacia, and Stromboli.

38 Philosopher's tower described.

39 Description of the great crater.

Having enjoyed for some time the beauty of this magnificent prospect, our author set about making a draught of the place from which the view was taken; and at length accomplished it, notwithstanding the great impediments he met with from the wind. Among the objects which he delineated on this occasion, the Philosopher's Tower was one. It seems, he says, not to be very ancient; neither the materials of which it consists, nor the mode of architecture, bearing any resemblance to those of the Greeks and Romans. The surrounding plain seems to consist entirely of a black sand intermixed with pieces of scoria, which have been formerly thrown out by the volcano. Beyond that plain, which rises gently, appears a cone, the summit of which is the volcanic crater. When viewed from the south side, on which they stood, this crater seems to consist of a number of small hills. Into these it was broken by the emission of the boiling torrent in the year 1755. When discharged from the crater, these waters spread towards the right; and at the distance of a mile eastward fell in a cascade from a prodigious height.

The violence of the wind beginning now to abate a little, the travellers set out for the very summit, in order to take a view of the great crater; in which journey

Etna.

(our author says) it would be difficult to make people, who have never engaged in such enterprises, comprehend all the obstacles they had to encounter. This cone (the little mountain mentioned by Sir William Hamilton) is composed of ashes, sand, and pozzolano, thrown up at different times by the volcano. The materials are so loose, that the adventurous traveller sinks about mid-leg at every step, and is in constant terror of being swallowed up. At last, when the summit is reached, the sulphureous exhalations, which are continually emitted from the pores of the mountain, threaten suffocation, and irritate the fauces and lungs in such a manner as to produce a very troublesome and incessant cough. The looseness of the soil, which gives way under the feet, obliges the traveller, every now and then, to throw himself flat on his belly, that so he may be in less danger of sinking. In this posture our author viewed the wide unfathomable gulph in the middle of the crater; but could discover nothing except a cloud of smoke, which issued from a number of small apertures scattered all around, and accompanied with a kind of noise. Another and more dreadful sound, however, issues from the bowels of the volcano, and which, according to our author, "strikes the heart with terror, so that all the strength of reason is necessary to prevent the observer from flying with precipitation from such a dreadful place." Several travellers who had visited this cone before him, were terrified by these dreadful sounds, that they fled with the utmost haste till they arrived at the foot of the mountain.

40
Description of the horrid noises continually issuing from the burning gulph.

Our author compares these sounds to a discharge of cannon in the wide abyss; the noise of which is rebellowed throughout all the caverns, and produce a sound perhaps the most alarming that can be imagined; and during the short space in which he listened, several of these discharges were heard to follow one another almost uninterruptedly.

This dreadful noise, our author, with very great probability, supposes to be occasioned by the explosions of the internal fire, or, as he calls it, the *focus* of the volcano; which, striking against the sides of these immense caverns, the sounds produced are re-echoed through their cavities, and probably multiplied in an extraordinary manner; so that what would be only a slight explosion in the open air, occasions a sound more tremendous than the loudest thunder. To such as are convinced of this, and have sufficient courage to resist the first impressions which these sounds must unavoidably occasion, they will in a short time not only appear exceedingly sublime, but, by their variety, even somewhat agreeable. "They enable us (says our author) to form some conception of the space through which they must pass before they reach the ear, and of the vast extent and width of the hollows of the mountain."

41
Impossible to walk round the crater.

Having for some time contemplated this awful spectacle, our author wished to measure the crater by walking round it; but found this impossible. On the north side the surface is hard and smooth, the ashes having been so far dissolved by the moisture deposited by the smoke as to cement into one uniform mass. This is sometimes dissolved even into a fluid state, in such a manner as to run down the sides of the cone; so that after several attempts, he was at last obliged to abandon his design.

Plate
LXXXIV.

Fig. 2. exhibits a view of the crater of Etna taken N^o 121.

on the brink of the east side. The fore-ground (*aa*) of the figure is one division of the crater. Beyond it are two eminences *b* and *c*, higher than that on which some human figures are represented. All the three form a triangle nearly equilateral; but, when viewed from any considerable distance, only two of them can be seen; for which reason the Sicilians have termed the mountain *bicornæ*, or double-horned.

Etna.

42
Explanation of the figure of the crater.

The smoke, as represented in the figure, issues from all quarters, either from chinks or holes scattered over the whole crater. But the situation of the principal mouth is in the midst of the three eminences. Its diameter, when our author visited this mountain, was only about 60 feet, and so filled with smoke that nothing remarkable could be discovered. From the height *d*, the rock situated on the left side of the print, and on which the human figures are represented, all the way to the rock *e* on the right, the distance is no more than 900 feet. Our author observed that the cone is not exactly in the middle of the plain, but is situated more towards the north than the south. He did not attempt to cross the central valley *f*, on account of the looseness of the ground, and that there was no object apparently worthy of the risk he must run in so doing. At the nearest view he took, it was only observed that there was snow lying in several parts of it, though the heat which otherwise prevailed seemed to be very intense.

The smoke which issues from the crater of Etna is generally carried in a direction from south to north; and, as it brings along with it a considerable quantity of water, the latter, condensed by the cold winds, runs down the side of the mountain in plentiful streams, and often leaves pretty permanent marks of its course. In this manner he accounts for the great eruption of water in 1755, which he supposes to have been occasioned only by an unusual quantity of water falling into the burning focus of the mountain, there rarefied into steam, and afterwards condensed by the coldness of the atmosphere.

43
Eruption of water in 1755 accounted for.

Like other travellers to mount Etna, this gentleman found the wind blowing from the south; and he is of opinion, that a southwind blows here more frequently than any other, as he did not observe any channels cut by the water on any other side than the north. He had several opportunities of making this observation, having frequently visited the top of Etna, and always paid attention to the crater. The sand on the east and west sides was always loose, while that on the north was compacted into a solid body. The three summits were of a later date than the rest of the crater, having been probably thrown up by some eruption which had burst it asunder. The black spots on the fore-ground represent a number of hillocks about the size of mole-hills, from which a sulphureous vapour constantly issues, and by which the adjacent ground is tinged of an ochery colour. This vapour issues from the crevices with a kind of hollow whistling noise; which with the volcanic thunder, smoke, and noxious smell, render it very disagreeable to stay here even for a few moments.

44
South wind generally prevalent on the top of Etna.

The smoke is represented in the figure precisely as it did on the day that he ascended, which was very warm. But it does not always rise in this manner; for when the cold is very intense, it collects into a body, and thickens around the edge of the crater: on which occasions it is condensed into water, which diffuses itself around the edge of the crater, and mixing with the ashes

Etna.

45
Intense cold
produced
by a south
wind.

46
Account of
the strata
at the foot
of Mount
Etna.

ashes converts them into a kind of clay. The cold on the top of this mountain is so intense, that travellers very often find their clothes insufficient to protect them; and it is remarkable that such intense cold is always produced by a south wind. The day that our author took his draught, the wind blew faintly from the north.

The base of mount Etna, according to M. Houel's observations, consists of alternate layers of lava and marine substances, which have been deposited successively one upon another. These alternate layers extend to an unknown depth. They must indeed go as far down as the level of the stratum of lava which was discharged by the volcano at its first origin. The last deposited by the sea is a range of calcareous mountains of a considerable height, and which are placed on a basis of lava. Beneath that layer of lava is another of sea-pebbles, which are well known to be rounded by their attrition against one another by the motion of the waves. This layer is of considerable depth, and lies upon a yellowish rock consisting of a species of indurated sand. The river Simeto flows over this rock, which it has cut away considerably. That part which is at present the bed of the river is much higher than the base of Etna that is on a level with the sea; and not the least thing occurs to suggest an idea of what has been the primary base of the volcano. The marine substances, already taken notice of, lie nearly in an horizontal direction, more or less so according to the nature of the surface on which they have been deposited.

47
Great number of
springs on
Mount
Etna.

Etna abounds very much with springs, fountains, and even rivers of considerable magnitude. Our author has computed, that if all the water flowing down the sides of this mountain were collected, it would fill the channel of a river 36 feet broad and 6 in depth. Many of the springs afford fine salt; some are very pure, and others are impregnated with noxious substances; while others are remarkable for their use in dyeing particular colours.

48
Whence
such a large
quantity of
water is de-
rived.

"It is worthy of notice (says our author), that streams of water, some of them more copious, others more scanty, are seen to issue at all different degrees of height, from the base to the summit of the mountain. Even in summer, when very little rain falls for three or four months, or when perhaps for that space there is no rain at all, and for three of which at least there is not an ounce of snow melted; even then a great number of rivulets continue to flow down the sides of Etna; and at the same time a number of streams, external and subterranean, each of them several feet wide, are, according to the accounts of the country people, plentifully supplied with water.

"As the trifling quantity of snow which is melted here even in the midst of summer, and the still smaller quantity deposited by the clouds, would be totally insufficient to supply those streams, and must be all absorbed by the earth for the support of vegetation, those streams must proceed from some other cause, whose effects are more copious and permanent. This cause is the evaporation of these aqueous particles which arise from the constant ebullition at the bottom of the volcanic focus. These issuing out at the great crater, and at innumerable chinks in the sides of the mountain, are soon condensed by the cold of that elevated region of the atmosphere,

49
Produced
by the in-
ternal eva-
poration of
the moun-
tain.

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and, percolating through the earth, give birth to those numerous streams in question.

"A volcano, according to my ideas, cannot subsist without water; nor can water occupy a place in any volcanic focus without being changed into vapour. But before that water can make its appearance, except in the form of smoke, it must have filled the whole volcanic cavern, and must have been forcibly pressed by the action of the fire against its sides: it must next have condensed, and assumed the form of water; in which state it must have penetrated through the inclined layers of sand and pozzolano which intervene betwixt the different strata of lava; for these strata lie one above another, and are full of chinks, in such a manner as to present to the eye an appearance pretty much resembling that of the inside of a tiled roof."

It has been a question, Whether the eruptions of mount Etna were more frequent in ancient than in modern times? At first it seems impossible to give a precise answer to such a question; but when we consider that the matter in the volcanic focus was then greater in quantity than at present, in proportion to the space which it occupied; that the cavities were then sooner filled with vapour; and that the centre of the focus was then less remote, we will not hesitate to pronounce, that in earlier times the eruptions were more frequent as well as more copious.

We shall close this article with an enumeration of all the different eruptions from mount Etna which are found upon record.

1. The first mentioned in history, is that of which Diodorus Siculus speaks, but without fixing the period at which it happened. That eruption, says he, obliged the Sicani, who then inhabited Sicily, to forsake the eastern, and retire to the southern, part of the island. A long time after that, the Sicilians, a people of Italy, migrated into Sicily, and took up their abode in that part of the island which had been left desert by the Sicani.

2. The second eruption known to have issued from this volcano, is the first of the three mentioned by Thucydides; of none of which he fixes the date, mentioning only in general, that from the arrival of the first Greek colonies that settled in Sicily (which was in the 11th Olympiad, and corresponds to the 734th year before the Christian era), to the 88th Olympiad, or the year 425 before Christ, Etna at three different times discharged torrents of fire. This second eruption happened, according to Eusebius, in the days of Phalaris, in the 565th year before the Christian era. The assertion of Eusebius is confirmed by a letter from that tyrant to the citizens of Catania, and the answer of the Catanians (if, after Bentley's Dissertations against their authenticity, any credit be due to the Epistles of Phalaris). But Diodorus gives both these pieces.

3. The third, which is the second of the three mentioned by Thucydides, happened in the 65th Olympiad, in the 477th year before the Christian era, when Xantippus was archon at Athens. It was in this same year the Athenians gained their boasted victory over Xerxes's general Mardonius near Platæa. Both the eruption of the volcano and the victory of the Athenians are commemorated in an ancient inscription on a marble table which still remains. An ancient medal

Etna.

50
Eruptions
of Etna
more fre-
quent an-
ciently than
now.

51
List of
eruptions
from the
earliest pe-
riod.

B

ex-

Etna.

exhibits a representation of an astonishing deed to which that eruption gave occasion. Two heroic youths boldly ventured into the midst of the flames to save their parents. Their names, which well deserved to be transmitted to future ages, were Amphinomus and Anapius. The citizens of Catania rewarded so noble a deed with a temple and divine honours. Seneca, Silius Italicus, Valerius Maximus, and other ancient authors, mention the heroism of the youths with just applause.

4. The fourth eruption, the third and last of those mentioned by Thucydides, broke out in the 88th Olympiad, in the 425th year before the Christian era. It laid waste the territory of Catania.

5. The fifth is mentioned by Julius Obsequens and Orosius, who date it in the consulship of Sergius Fulvius Flaccus and Quintus Calpurnius Piso, nearly 133 years before the Christian era. It was considerable; but no peculiar facts are related concerning it.

6. In the consulship of Lucius Emilius Lepidus and Lucius Aurelius Orestes, in the 125th year before the Christian era, Sicily suffered by a violent earthquake. Such a deluge of fire streamed from Etna as to render the adjoining sea into which it poured absolutely hot. Orosius says, that a prodigious quantity of fishes were destroyed by it. Julius Obsequens relates, that the inhabitants of the isles of Lipari eat such a number of those fishes, as to suffer, in consequence of it, by a distemper which proved very generally mortal.

7. Four years after the last mentioned, the city of Catania was desolated by another eruption not less violent. Orosius relates, that the roofs of the houses were broken down by the burning ashes which fell upon them. It was so dreadfully ravaged, that the Romans found it necessary to grant the inhabitants an exemption from all taxes for the space of ten years, to enable them to repair it.

8. A short time before the death of Cæsar, in the 43d year before Jesus Christ, there was an eruption from mount Etna. Livy mentions it. It was not distinguished by any thing extraordinary. It was afterwards considered as an omen of the death of Cæsar.

9. Suetonius, in the life of Caligula, mentions an eruption from mount Etna which happened in the 40th year after the Christian era. The emperor fled on the very night on which it happened, from Messina, where he at that time happened to be.

10. Carrera relates, that in the year 253, there was an eruption from mount Etna.

11. He speaks of another in the year 420; which is also mentioned by Photius.

12. In the reign of Charlemagne, in the year 812, there was an eruption from Etna. Geoffroy of Viterbo mentions it in his Chronicle.

13. In the year 1169, on the 4th of February, about day-break, there was an earthquake in Sicily, which was felt as far as Reggio, on the opposite side of the strait. Catania was reduced by it to ruins; and in that city more than 15,000 souls perished. The bishop, with 44 monks of the order of St Benedict, were buried under the ruins of the roof of the church of St Agatha. Many castles in the territories of Catania and Syracuse were overturned; new rivers burst forth, and ancient rivers disappeared. The ridge of the mountain was observed to sink in on the side next

Taormina. The spring of Arethusa, so famous for the purity and sweetness of its waters, then became muddy and brackish. The fountain of Ajo, which rises from the village of Saraceni, ceased to flow for two hours; at the end of which the water gushed out more copiously than before. Its waters assumed a blood-colour, and retained it for about an hour. At Messina, the sea, without any considerable agitation, retired a good way within its ordinary limits; but soon after returning, it rose beyond them, advanced to the walls of the city, and entered the streets through the gates. A number of people who had fled to the shore for safety were swallowed up by the waves. Ludovico Aurelio relates, that the vines, corn, and trees of all sorts, were burnt up, and the fields covered over with such a quantity of stones as rendered them unfit for cultivation.

14. Twelve years after this, in the year 1181, a dreadful eruption issued from Etna on the east side. Streams of fire ran down the declivity of the mountain, and encircled the church of St Stephen, but without burning it.

Nicolas Speciale, who relates, though he did not see, this event, was witness to another conflagration on Etna 48 years after this, in the year 1329, on the 23d of June, of which he has given a description.

15. On that day, says he, about the hour of vespers, Etna was strongly convulsed, and uttered dreadful noises; not only the inhabitants of the mountain, but all Sicily, were struck with consternation and alarm. On a sudden, a terrible blaze of fire issued from the southern summit, and spread over the rocks of Mazarra, which are always covered with snow. Together with the fire, there appeared a great deal of smoke. After sun-set, the flames and the stones that issued out with them were seen to touch the clouds. The fire making way for itself with the most furious impetuosity, burnt up or reduced to ruins all those structures which the piety of former times had consecrated to the Deity. The earth yawning, swallowed up a great many springs and rivulets. Many of the rocks on the shore of Mascali were shaken and dashed into the sea. A succession of these calamities continued till the 15th of July, when the bowels of Etna were again heard to rebel. The conflagration of Mazarra still went on unextinguished. The earth opened near the church of St John, called *Il Paparinacca*; on the south side fire issued from the gap with great violence: to add to the horrors of the day, the sun was obscured from morning to evening with clouds of smoke and ashes, as entirely as in an eclipse. Nicolas Speciale went towards the new-opened crater, to observe the fire and the burning stones which were issuing from the volcano. The earth rebelled and tottered under his feet; and he saw red-hot stones issue four times successively in a very short space from the crater, with a thundering noise, the like of which, he says, he had never before heard.

In a few days after this, all the adjacent fields were burnt up by a shower of fire and sulphureous ashes; and both birds and quadrupeds being thus left destitute of food, died in great numbers. A great quantity of fishes likewise died in the rivers and the contiguous parts of the sea. "I cannot think (says he) that either Babylon or Sodom was destroyed with such a

Etna.

Etna. ful severity." The north winds, which blew at the time, carried the ashes as far as Malta. Many persons of both sexes died of terror.

16. Scarce had four years elapsed after this terrible event, when Etna made a new explosion, and discharged volleys of stones, causing the neighbouring fields to tremble. This happened in the year 1333.

17. Forty-eight years after this, on the 25th of August 1381, an eruption from Etna spread its ravages over the confines of the territory of Catania, and burnt up the olive-yards in the neighbourhood of that city.

18. In the year 1444, 63 years after the last eruption, a torrent of lava issued from Etna and ran towards Catania. The mountain shook; and the shocks were so violent, that several huge masses of rock were broken from its summit, and hurled into the abyss with a tremendous noise.

19. After this Etna was scarce at rest for 18 months or 2 years. On Sunday the 25th of September 1446, about an hour after sun-set, an eruption issued from the place called *La Pietra di Mazarra*. This eruption was soon over.

20. On the following year, 1447, on the 21st of September, there was another, with a good deal of fire; but this eruption was likewise of short duration.

21. Etna now ceased to emit fire, and that for a considerable time. The neighbouring inhabitants not only ascended to the summit of the mountain, but even, if we may credit accounts, went down into the fiery gulph, and believed the volcanic matter to be now exhausted: But on the 25th of April 1536, near a century from the slight eruption in 1447, a strong wind arose from the west, and a thick cloud, reddish in the middle, appeared over the summit of the mountain. At the very same instant a large body of fire issued from the abyss, and fell with the noise and rapidity of a torrent along the eastern side of the mountain, breaking down the rocks, and destroying the flocks and every other animal that was exposed to its fury. From the same crater, on the summit of the mountain, there issued at the same time a stream of fire more terrible than the other, and held its course towards the west. It run over Bronte, Adrans, and Castelli. It consisted entirely of sulphur and bitumen. On the same day the church of St Leon, which stood in a wood, was first demolished by the shocks of the earthquake, and its ruins after that consumed by the fire. Many chasms were opened in the sides of the mountain; and from those issued fire and burning stones, which darted up into the air with a noise like that produced by a smart discharge of artillery. Francis Negro de Piazza, a celebrated physician, who lived at Lentini, wishing to have a nearer view of the eruptions, and to make some observations which he thought might be of consequence, was carried off and burnt to ashes by a volley of the burning stones. This conflagration of Etna lasted some weeks.

22. In less than a year, on the 17th of April 1537, the river Simeto swelled so amazingly as to overflow the adjacent plains, and carry off the country people and their cattle and other animals. At the same time, the country around Paterno, the neighbouring castles, and more than 500 houses, were destroyed by the ravages

of the river; and most of the wood was torn up by the roots by violent blasts of wind. These ravages of the elements were occasioned by Etna, which on the 11th of the following month was rent in several places, disclosing fiery gulphs, and pouring out a deluge of fire in more terrible torrents than those of the preceding year. They directed their course towards the monastery of St Nicholas d'Arena; destroyed the gardens and vineyards; and proceeding onwards towards Nicolosi, burnt Montpelieri and Fallica, and destroyed the vineyards and most of the inhabitants. When the conflagration ceased, the summit of the mountain sunk inwards with such a noise, that all the people in the island believed the last day to be arrived, and prepared for their end by extreme unction. These dreadful disturbances continued through the whole year, more especially in the months of July and August, during which all Sicily was in mourning. The smoke, the noise, and the shocks of the earthquake, affected the whole island; and if Filotes may be believed, who relates this event, many of the Sicilians were struck deaf by the noise. Many structures were demolished; and among others the castle of Corleone, though more than 25 leagues distant from the volcano.

23. During the succeeding 30 years there was no disturbance of this nature. At the end of that space, Sicily was alarmed by a new eruption from the mountain. Etna discharged new streams of fire, and covered the adjacent country with volcanic ashes, which entirely ruined the hopes of the husbandman.

24. In the year 1579, Etna renewed its ravages; but no particular account of the damage which it did upon this occasion has been transmitted to us.

25. Twenty-five years had elapsed, when Etna, in the month of June 1603, flamed with new fury. Peter Carrera affirms, that it continued to emit flames for the space of 33 years, till 1636, without interruption, but not always with the same violence. In 1607, the streams of lava which flowed from it destroyed the woods and vineyards on the west side of the mountain. In 1609, they turned their course towards Aderno, and destroyed a part of the forest del Pino, and a part of the wood called *la Sciambrita*, with many vineyards in the district Costerna. Those torrents of lava continued to flow for three months. In the year 1614, a new effort of the subterraneous fire opened another crater, from which fire was discharged on Randazzo, in the district called *il Piro*. The fire continued to flame for 10 or 12 years longer.

26. The same Peter Carrera relates, that a dreadful conflagration happened in the year 1664, of which he himself was witness. It happened on the 13th of December, and lasted without interruption, but with different degrees of violence, till the end of May 1678. But in 1669 the inhabitants of Nicolosi were obliged to forsake their houses, which tumbled down soon after they left them. The crater on the summit of Etna had not at this time a threatening aspect, and every thing there continued quiet till the 25th of March: but on the 8th of that month, an hour before night, the air was observed to become dark over the village la Pedara and all that neighbourhood; and the inhabitants of that country thought that an almost total eclipse was taking place. Soon after sun-

Etna.

set, frequent shocks of earthquake began to be felt; these were at first weak, but continued till day-break to become more and more terrible. Nicolosi was more affected than any other tract of country on that side of Etna: about noon every house was thrown to the ground; the inhabitants fled in consternation, and invoking the protection of heaven. On the 10th of March a chasm several miles in length, and five or six feet wide, opened in the side of the mountain; from which, about two hours before day, there arose a bright light, and a very strong sulphureous exhalation was diffused through the atmosphere.

About 11 in the forenoon of the same day, after dreadful shocks of earthquake, a crater was opened on the hill called *des Noisettes*, from which there issued huge volumes of smoke, not accompanied with fire, ashes, or stones, but with loud and frequent claps of thunder, displaying all the different phenomena with which thunder is at different times attended. And what was very remarkable, the chasm was formed on the south side, between the top and the bottom of the mountain. On the same day another chasm was formed two miles lower, from which issued a great deal of smoke, accompanied with a dreadful noise and earthquake. Towards the evening of the same day, four other chasms were opened towards the south, in the same direction, accompanied during their formation with the same phenomena, and extending all the way to the hill called *la Fusara*.

About 12 paces beyond that, another of the same kind was formed. On the succeeding night, a black smoke, involving a quantity of stones, issued from this last chasm; it discharged at the same time flakes of a dark earth-coloured spongy matter, which became hard after they fell. There issued from the same gulph a stream of lava, which held its course into a lake called *la Hardia*, six miles from Montpellieri, and on its way thither destroyed many dwelling-houses and other buildings in the neighbouring villages.

On the next day, March 12th, this stream of fire directed its course towards the tract of country called *Malpasso*, which was inhabited by 800 people: in the space of 20 hours it was entirely depopulated and laid waste. The lava then took a new direction, in which it destroyed some other villages.

The mount of Montpellieri was next destroyed with all the inhabitants upon it.

On the 23d of the same month the stream of fire was in some places two miles broad. It now attacked the large village of Mazzalucia; and on the same day a vast gulph was formed, from which were discharged sand or ashes, which produced a hill with two summits, two miles in circumference and 150 paces high. It was observed to consist of yellow, white, black, grey, red, and green, stones.

The new mount of Nicolosi continued to emit ashes for the space of three months; and the quantity discharged was so great as to cover all the adjoining tract of country for the space of 15 miles: some of those ashes were conveyed by the winds as far as Messina and Calabria; and a north wind arising, covered all the southern country about Agosta, Lentini, and even beyond that, in the same manner.

While at that height on Nicolosi so many extraordinary appearances were passing, the highest crater

on the summit of Etna still preserved its usual tranquillity.

On the 25th of March, about one in the morning, the whole mountain, even to the most elevated peak, was agitated by a most violent earthquake. The highest crater of Etna, which was one of the loftiest parts of the mountain, then sunk into the volcanic focus; and in the place which it had occupied, there now appeared nothing but a wide gulph more than a mile in extent, from which there issued enormous masses of smoke, ashes, and stones. At that period, according to the historian of this event, the famous block of lava on mount Frumento was discharged from the volcanic focus.

In a short time after, the torrent of fire, which still continued to flow, directed its course towards Catania with redoubled noise, and accompanied with a much greater quantity of ashes and burning stones than before. For several months many most alarming shocks of earthquake were felt; and the city was threatened with destruction by the torrent of fire. They in vain attempted to turn or divert its course; the lava rose over the walls, and entered by an angle near the Benedictine convent on the 11th of June following. This awful event is related by Francis Monaco, Charles Mancius, Vincent Auria, and Thomas Thedesch.

27. Some years after this conflagration, a new burning gulph opened in the month of December 1682 on the summit of the mountain, and spread its lava over the hill of Mazarra.

28. On the 24th of May 1686, about ten in the evening, a new eruption burst out from the summit of the mountain, on the side contiguous to the hill del Bue. Such a quantity of inflamed matter was thrown out as consumed woods, vineyards, and crops of grain for four leagues round. It stopped its course in a large valley near the castle of Mafcali. Several people from the neighbourhood had ascended a hill between the wood of Catania and the confines of Cirrita to observe the progress of the lava: but the hill, on a sudden, sunk inwards, and they were buried alive.

29. Etna was now long quiet; for no less a space of time indeed than one half of the present age. In the year 1755 its eruptions were renewed. It opened near mount Lepra, and emitted as usual fire and smoke; after which it remained quiet only for eight years.

30. In the year 1763, there was an eruption which continued three months, but with intervals. Etna was at first heard to rebel. Flames and clouds of smoke were seen to issue out, sometimes silver-coloured, and at other times, when the rays of the sun fell upon them, of a purple radiance: at length they were carried off by the winds, and rained, as they were driven before them, a shower of fire all the way to Catania and beyond it. An eruption soon burst out; the principal torrent divided into two branches, one of which ran towards the east, and fell into a deep and extensive valley.

The flames which issued from this new crater afforded a noble spectacle. A pyramid of fire was seen to rise to a prodigious height in the air, like a beautiful artificial fire-work, with a constant and formidable battery, which shook the earth under those who were spectators of the scene. Torrents of melted matter running

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Etna,
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running down the sides of the mountain, diffused a light bright as day through the darkness of night.

At sun-rising the burning lava was observed to have run round some oaks that were still standing unburnt. Their leaves were all withered. Some birds had fallen from their branches, and been burnt to death. Some people cast wood upon the lava, and it was immediately burnt. This lava continued hot, and exhaled smoke for two years. For five years after this, no snow appeared on the summit of Etna.

31. In the year 1764 a new crater was opened at a great distance from mount Etna.

32. In the year 1766 another was opened at the grotto of Paterno: fire, smoke, and an inconsiderable torrent of lava issued out of it.

33. On the 27th of January 1780 a new opening was formed two miles under the last mentioned crater. On the 28th of February, and the 14th of March, the earthquake was renewed on the north side, and accompanied with terrible noises.

Between the 6th of April and the 7th of May the convulsions were again renewed, accompanied with noise as before; a quantity of pumice-stones and fine sand was discharged from it.

On the 18th of May the shocks were renewed: on the 23d a new crater was formed on the side of mount Frumento on the summit of Etna; and from it a torrent of lava discharged, which spread through the valley of Laudunza. It was 200 paces in breadth. Two other chinks were opened in the mountain near Paterno, and very near one another. The lava issuing from them proceeded in the space of seven days six miles; on the 25th it had run nine miles.

A new crater was likewise opened on the 25th; from which a quantity of red-hot stones continued to issue for half an hour, and fell at a very great distance: there proceeded likewise from it a stream of lava; which, in the same space of time, ran over a tract of country two miles in extent.

Several parts of those streams of lava were observed to be cool on the surface, and formed into solid masses, but melted again by a new stream of burning lava, which however did not melt the old lava.

34. The last eruption of Etna happened in 1787, as described in the former article *ÆTNA*, p. 222, 223.

ETOLIA, a country of ancient Greece, comprehending all that tract now called the *Despotat*, or *Little Greece*. It was parted on the east by the river Evenus, now the Fidari, from the Locrenses Ozolæ; on the west, from Acarnania by the Achelous; on the north, it bordered on the country of the Dorians and part of Epirus; and, on the south, extended to the bay of Corinth.

The Etolians were a restless and turbulent people; seldom at peace among themselves, and ever at war with their neighbours; utter strangers to all sense of friendship or principles of honour; ready to betray their friends upon the least prospect of reaping any advantage from their treachery: in short, they were looked upon by the other states of Greece no otherwise than as outlaws and public robbers. On the other hand, they were bold and enterprising in war; inured to labour and hardships; undaunted in the greatest dangers; jealous defenders of their liberties, for which they were, on all occasions, willing to venture their

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lives, and sacrifice all that was most dear to them.

They distinguished themselves above all the other nations of Greece, in opposing the ambitious designs of the Macedonian princes; who, after having reduced most of the other states, were forced to grant them a peace upon very honourable terms. The constitution of the Etolian republic was copied from that of the Achæans, and with a view to form, as it were, a counter alliance; for the Etolians bore an irreconcilable hatred to the Achæans, and had conceived no small jealousy at the growing power of that state. The Cleomenic war, and that of the allies, called the *social war*, were kindled by the Etolians in the heart of Peloponnesus, with no other view but to humble their antagonists the Achæans. In the latter, they held out, with the assistance only of the Eleans and Lacedæmonians, for the space of three years, against the united forces of Achaia and Macedon; but were obliged at last to purchase a peace, by yielding up to Philip all Acarnania. As they parted with this province much against their will, they watched all opportunities of wresting it again out of the Macedonian's hands; for which reason they entered into an alliance with Rome against him, and proved of great service to the Romans in their war with him: but growing insolent upon account of their services, they made war upon the Romans themselves. By that warlike nation they were overcome, and granted a peace on the following severe terms: 1. The majesty of the Roman people shall be revered in all Etolia. 2. Etolia shall not suffer the armies of such as are at war with Rome to pass through her territories, and the enemies of Rome shall be likewise the enemies of Etolia. 3. She shall, in the space of 100 days, put into the hands of the magistrates of Corcyra all the prisoners and deserters she has, whether of the Romans or their allies, except such as have been taken twice, or during her alliance with Rome. 4. The Etolians shall pay down in ready money, to the Roman general in Etolia, 200 Euboic talents, of the same value as the Athenian talents, and engage to pay 50 talents more within the six years following. 5. They shall put into the hands of the consul 40 such hostages as he shall choose; none of whom shall be under 12, or above 40 years of age: the pretor, the general of the horse, and such as have been already hostages at Rome, are excepted out of this number. 6. Etolia shall renounce all pretensions to the cities and territories which the Romans have conquered, though those cities and territories had formerly belonged to the Etolians. 7. The city of Oenis, and its district, shall be subject to the Acarnanians.

After the conquest of Macedon by Paulus Æmilius, they were reduced to a much worse condition; for not only those among them, who had openly declared for Perseus, but such as were only suspected to have favoured him in their hearts, were sent to Rome, in order to clear themselves before the senate. There they were detained, and never afterwards suffered to return into their native country. Five hundred and fifty of the chief men of the nation were barbarously assassinated by the partisans of Rome, for no other crime but that of being suspected to wish well to Perseus. The Etolians appeared before Paulus Æmilius in mourning habits, and made loud complaints of such inhuman

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inhuman treatment; but could obtain no redress: nay, ten commissioners, who had been sent by the senate to settle the affairs of Greece, enacted a decree, declaring, that those who were killed had suffered justly, since it appeared to them that they had favoured the Macedonian party. From this time those only were raised to the chief honours and employments in the Etolian republic who were known to prefer the interest of Rome to that of their country; and as these alone were countenanced at Rome, all the magistrates of Etolia were the creatures and mere tools of the Roman senate. In this state of servile subjection they continued till the destruction of Corinth, and the dissolution of the Achaean league; when Etolia, with the other free states of Greece, was reduced to a Roman province, commonly called the *province of Achaia*. Nevertheless, each state and city was governed by its own laws, under the superintendency of the pretor whom Rome sent annually into Achaia. The whole nation paid a certain tribute, and the rich were forbidden to possess lands any where but in their own country.

In this state, with little alteration, Etolia continued under the emperors, till the reign of Constantine the Great, who, in his new partition of the provinces of the empire, divided the western parts of Greece from the rest, calling them *New Epirus*, and subjecting the whole country to the *praefectus praetorii* for Illyricum. Under the successors of Constantine, Greece was parcelled out into several principalities, especially after the taking of Constantinople by the Western princes. At that time, Theodorus Angelus, a noble Grecian, of the Imperial family, seized on Etolia and Epirus. The former he left to Michael his son; who maintained it against Michael Palaeologus, the first emperor of the Greeks, after the expulsion of the Latins. Charles, the last prince of this family, dying in 1430 without lawful issue, bequeathed Etolia to his brother's son, named also *Charles*; and Acarnania to his natural sons, Memnon, Turnus, and Hercules. But, great disputes arising about this division, Amurath II. after the reduction of Theffalonica, laid hold of so favourable an opportunity, and drove them all out in 1432. The Mahometans were afterwards dispossessed of this country by the famous prince of Epirus, George Castriot, commonly called *Scanderbeg*; who, with a small army, opposed the whole power of the Ottoman empire, and defeated those barbarians in 22 pitched battles. That hero, at his death, left great part of Etolia to the Venetians; but, they not being able to make head against such a mighty power, the whole country was soon reduced by Mohammed II. whose successors hold it to this day.

ETRURIA. See HETRURIA.

ETYMOLOGY, that part of grammar which considers and explains the origin and derivation of words, in order to arrive at their first and primary signification, whence Quintilian calls it *originatio*.—The word is formed of the Greek *αληθεια* *verus*, “true,” and *λεγω* *dico*, “I speak;” whence *λογια* *discourse*, &c. and thence Cicero calls the etymology *notatio* and *veriloquium*; though Quintilian chooses rather to call it *originatio*.

A judicious inquiry into etymologies is thought by some of considerable use; because nations, who value themselves upon their antiquity, have always look-

ed on the antiquity of their language as one of the best titles they could plead; and the etymologist, by seeking the true and original reason of the notions and ideas fixed to each word and expression, may often furnish an argument of antiquity, from the traces remaining thereof, compared with the ancient uses. Add, that etymologies are necessary for the thorough understanding of a language. For, to explain a term precisely, there seems a necessity for recurring to its first imposition, in order to speak justly and satisfactorily thereof. The force and extent of a word is generally better conceived when a person knows its origin and etymology.

It is objected, however, that the art is arbitrary, and built altogether on conjectures and appearances; and the etymologists are charged with deriving their words from where they please. And indeed it is no easy matter to go back into the ancient British and Gaulish ages, and to follow, as it were, by the track, the various imperceptible alterations a language has undergone from age to age; and as those alterations have sometimes been merely owing to caprice, it is easy to take a mere imagination or conjecture for a regular analogy: so that it is no wonder the public should be prejudiced against a science which seems to stand on so precarious a footing. It must certainly be owned, that etymologies are frequently so far fetched, that one can scarce see any resemblance or correspondence therein. Quintilian has shown, that the ancient etymologists, notwithstanding all their learning, fell into very ridiculous derivations.

The etymologies of our English words have been derived from the Saxon, Welch, Walloon, Danish, Latin, Greek, &c.

In the present work the etymologies of terms are generally noted, where their obviousness does not render it unnecessary, or their dubiety or unimportance useless.

EVACUANTS, in pharmacy, are properly such medicines as diminish the animal fluids, by throwing out some morbid or redundant humour; or such as thin, attenuate, and promote the motion and circulation thereof.

EVACUATION, in medicine, the art of diminishing, emptying, or attenuating, the humours of the body.

EVAGRIUS SCHOLASTICUS, a famous historian, born at Epiphania, about the year 536. He practised the profession of an advocate, from which he was called *Scholasticus*, which name was then given to the pleaders at the bar. He was also tribune and keeper of the prefect's dispatches. He wrote an ecclesiastical history, which begins where Socrates and Theodoret ended theirs; and other works, for which he was rewarded by the emperors Tiberius and Mauricius. M. de Valois published at Paris a good edition of Evagrius's ecclesiastical history, in folio; and it was republished at Cambridge in 1620, in folio, by William Reading, with additional notes of various authors.

EVANDER, a famous Arcadian chief, called the son of mercury, on account of his eloquence, brought a colony of his people into Italy, about 60 years before the taking of Troy; when Faunus, who then reigned over the Aborigenes, gave him a large extent of country, in which he settled with his friends. He is said to have taught the Latins the use of letters, and the art of husbandry. He kindly received Hercules

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Evangelists when he returned from the conquest of Geryon, and he was the first who raised him altars. He gave Æneas assistance against the Rutuli, and distinguished himself by his hospitality. It is said that he first brought the Greek alphabet into Italy, and introduced there the worship of the Greek deities. He was honoured as a God after death, and his subjects raised him an altar on mount Aventine.

EVANGELISTS, the inspired authors of the gospels. The word is derived from the Greek *ευαγγελιον*, formed of *eu bene*, "well," and *αγγελος* "angel or messenger."

The denomination *evangelists* was likewise given in the ancient church to such as preached the gospel up and down, without being attached to any particular church, being either commissioned by the apostles to instruct the nations, or of their own accord abandoning every worldly attachment and consecrating themselves to the sacred office of preaching the gospel. In which sense some interpreters think it is that St Philip, who was one of the seven deacons, is called the *evangelist*, in the 21st chapter of the Acts of the Apostles, ver. 8. Again, St Paul writing to Timothy, Ep. ii. cap. iv. ver. 5. bids him do the work of an evangelist. The same apostle, Eph. iv. 11. ranks the evangelists after the apostles and prophets.

EVANID, a name given by some authors to such colours as are of no long duration, as those in the rainbow, in clouds before and after sun-set, &c.

Evand colours are also called *fantastical* and *emphatical* colours.

EVANTES, in antiquity, the priestesses of Bacchus, thus called, because in celebrating the orgia they ran about as if distracted, crying, *Evan, evan, ohé evan*. See **BACCHANALIA**.

EVAPORATION, in natural philosophy, signifies the conversion of fluids, principally water, into vapour, so that it becomes specifically lighter than the atmosphere.

The theory of evaporation, and formation of vapour by the absorption of heat, is fully discussed under the article **CHEMISTRY**; it remains only therefore to take notice of some of the most remarkable phenomena attending it. With regard to water, it is generally allowed that it evaporates in every degree of heat above 32° to 212°, which is its boiling point, when it is dissipated in great quantity, and as fast as possible. It has also been supposed to evaporate even after its conversion into ice; but some late authors have denied this to be the case. Other liquids, such as spirit of wine or ether, continue to evaporate long after they have been cooled down to the freezing point of water; nor is there any experiment by which it has yet been discovered at what degree their evaporation ceases. Even quicksilver, to appearance a much more heavy and sluggish fluid, and which does not boil without applying almost three times the heat necessary to make water boil, is found readily to evaporate when the pressure of the atmosphere is taken off; and hence the empty parts of barometrical tubes, where the instruments were made with great accuracy and the tubes perfectly exhausted, have been covered with mercurial globules, owing to an invisible vapour ascending from the surface of the metal. In like manner the evaporation of water is very sensible in some experiments with the air-pump. Dr Priestley found, that where

moisture was carefully excluded from his apparatus, he was never able to produce such a quantity of inflammable air by heating charcoal as when a little quantity of water was admitted by moistening the leather on which the receiver stood. Nor is the elasticity of this kind of steam altogether imperceptible; for in the barometer above mentioned, the accuracy of the instrument was considerably affected by the steam of the mercury ascending from it, and occupying the void space in the upper part of the glass tube.

Evaporation, according to the experiments of the Abbé Nollet, appears to be promoted by electricity. The conclusions drawn from them are, 1. Electricity augments the natural evaporation of fluids; all that were tried, excepting mercury and oil, being found to suffer a considerable diminution, greater than what could be ascribed to any other cause. 2. Electricity augments the evaporation of those fluids the most which are found most readily to evaporate spontaneously; the volatile spirit of sal-ammoniac suffering a greater loss than spirit of wine or oil of turpentine, these two more than common water, and water more than vinegar or a solution of nitre. 3. The effects seemed always to be greatest when the vessels containing the fluids were non-electrics. 4. The increased evaporation was more considerable when the vessel which contained the liquor was more open; but the effects did not increase in proportion to the apertures. 5. Electricity was also found to increase the evaporation from solid bodies, and of consequence to augment the insensible perspiration of animals.

Evaporation is one of the great natural processes, and by means of it the whole vegetable kingdom is supplied with rain necessary for its support. This evaporation takes place at all times, not only from the surface of the ocean, but of the earth also. Dr Halley, by an experiment with a pan of water kept in the heat of our summer sun, found, that as much water might be reasonably supposed to evaporate from the surface of the Mediterranean sea, as would be sufficient to supply all the rivers which run into it. Dr Watson in his Chemical Essays, has shown, that the evaporation is not less considerable from the surface of the land than from that of the sea. By inverting a glass vessel on the ground, in the time of a considerable drought, he found that even then about 1600 gallons of water were raised from an acre in 24 hours; and repeating the experiment after a thunder-shower, he found that in such a state an acre parted with above 1900 gallons of water in 12 hours.

This evaporation is carried on not only from the ground itself, but from the leaves of trees, grass, &c. with which it is covered; and great part of the water thus raised falls down again in the night-time in dew, being absorbed by the same vegetables which yielded it before. Thus the earth is not so soon exhausted of water, even for a little way below the surface, as we might be apt to imagine from the quantity raised by evaporation: for if all that was raised by the sun's heat during the time of a long drought, left the earth not to return to it for perhaps five or six weeks, the whole vegetable kingdom, at least such as do not strike their roots very deeply into the ground, must of necessity be destroyed; which yet we see is only the case with the most tender grass, and even that

only

Evaporation.

Evapora-
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Cold pro-
duced by
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only on the most elevated situations, and when most exposed to the sun.

Another great use of the natural evaporation is to cool the earth, and prevent its being too much heated by the sun. This property of producing cold by evaporation has been but lately observed by chemists, though it has long been employed by those who knew not the reason of their doing so. It has been observed at Aleppo in Syria, that the water in their jars is always the coolest when the weather is most warm and the power of the sun excessive. The heats in that part of the world are sometimes almost intolerable; and at that time the evaporation from the outside of the jars, which are made of porous clay, is very copious; and in proportion to the quantity of water evaporated from without, is the degree of cold in the liquor within. The reason of this is easily deduced from what is said under the article CHEMISTRY; where it is shown that vapour is composed of fire and water united together. The consequence of this is, that wherever there is any quantity of latent heat above 32° of Fahrenheit contained in any body, the water in contact with the surface, or contained in the pores of the body, will gradually absorb it, and converting it into latent heat, will thus be rendered specifically lighter than the common atmosphere, and fly off into it. Thus part of the sensible heat of the body will be carried off; and as subsequent quantities of water always fly off with more and more of the sensible heat, it is plain, that by continued evaporation of water almost all the sensible heat above 32° of Fahrenheit will be carried off. If instead of water, spirit of wine be made use of, which continues to evaporate long after it is cooled to 32°, a much greater degree of cold may be produced than by the evaporation of mere water; and if instead of spirit of wine, we make use of ether, which is still more volatile than spirit of wine, an excessive degree of cold, scarcely inferior to that which congeals mercury, may be produced.

This method of producing cold by means of the expensive liquids of ether and spirit of wine, cannot be employed excepting merely for the sake of experiment: but that by the evaporation of water may be applied to very useful purposes in the warm countries; and it has been customary with sailors to cool their casks of liquors by sprinkling them with sea water.

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Effects of
evaporation
on the hu-
man body.

From the theory of evaporation laid down under the article CHEMISTRY, we may easily see the reason why, in a very warm temperature, animal bodies have the power of producing cold. A vapour, called insensible perspiration, continually issues from the bodies of animals, from human bodies especially, which, carrying off great quantities of their sensible heat, enables them, according to its quantity, to preserve the same temperature in many different degrees of atmospherical heat.

For the same reason also we may see why the continual sprinkling with cold water is so very powerful in depriving the human body of the heat necessary for the support of life, even though the temperature of the water should not be below what can be easily borne. It has already been shown, that by the evaporation of water, a degree of cold not much inferior to that of freezing water may be produced; and consequently, by continual sprinkling of the body with water, the whole might in time be reduced to nearly the degree

N^o 121.

of cold in which water freezes. But this is what no human body can bear: and hence we may understand why storms of rain and snow are often fatal; and likewise why, in cases of shipwreck, people have died by being exposed for a few hours to the spray of the sea.

The theory of the evaporation of water laid down under the article CHEMISTRY, furnishes us also with a solution of a very curious phenomenon, inexplicable on any other principle, viz. why melting ice will freeze other pieces together more strongly; and, if a considerable degree of heat is not continued for some time, will again consolidate itself into a much harder mass than before. The fact was discovered by Mr Wedgewood in an attempt to connect his clay thermometer with the common mercurial ones. In this attempt he had occasion to repeat an experiment made by Messrs Lavoisier and de la Place, who had measured the heat of bodies by the quantity of ice they are capable of liquefying. These authors observe, that if ice, cooled to any degree below the freezing point, be exposed to a warmer atmosphere, it will be brought up to the freezing point through its whole mass before any part of it begins to liquefy; and that consequently ice, beginning to melt on the surface, will be always exactly at the same temperature, viz. at the freezing point; and that if a heated body be inclosed in a hollow sphere of such ice, the whole of its heat will be occupied in melting it: so that if the ice be defended from external warmth, by surrounding it with other ice in a proper vessel, the weight of the water produced from it will be exactly proportional to the heat which the heated body has lost; or, in other words, will be a true physical measure of the heat. For the experiment, they provide a tin vessel divided by upright concentric partitions into three compartments, one within another. The innermost compartment is a wire-cage for receiving the heated body; the second, surrounding this cage, is filled with pounded ice, to be melted by the heat; and the outermost is filled also with pounded ice, to defend the former from the warmth of the atmosphere. The first of these ice compartments terminates at bottom in a stem like a funnel, through which the water is conveyed off; and the other ice compartment terminates in a separate canal for discharging the water into that ice which is reduced. As soon as the heated body is dropped into the cage, a cover is put on, which goes over both that and the first ice compartment; which cover is itself a kind of shallow vessel filled with pounded ice, with holes in the bottom for permitting the water to pass from this ice into the second compartment; all the liquefaction that happens in both being only the effect of the heated body. Another cover, with pounded ice, is placed over the whole as a defence from external warmth.

Mr Wedgewood began by satisfying himself that ice did really acquire the temperature of 32° throughout its whole substance before it began to melt; but being apprehensive that the pounded ice might imbibe and retain some water amongst it by capillary attraction, he judged it necessary to attend to this circumstance also. Having therefore pounded some ice, he laid it in a conical heap on a plate; and having at hand some water coloured with cochineal, he poured it gently into the plate at some distance from the heap. It rose hastily to the top, and was retained by the mass as by

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a sponge; nor did any part of it begin to drop till the heat of his hand began to liquefy the mass. He farther observed, that in a conical heap of this kind the water rose two inches and a half in the space of three minutes; and by weighing the water employed, and what remained upon the plate unabsorbed, it appeared that four ounces of ice had taken up and retained one ounce of water. To ascertain this absorbing power of ice more fully, he pressed six ounces of it into a funnel, having first introduced a wooden core, in order to leave a proper cavity in the middle; then taking out the core, and pouring an ounce of water on the ice, he left the whole for half an hour, during which time there ran out only 12 pennyweights and four grains; so that the ice had retained seven pennyweights and 20 grains; nearly one-twelfth of its own weight, and two-fifths of the weight of the water.

Being now convinced that it would be proper to use solid ice instead of that which was pounded, he determined to congeal a quantity of water into one mass by a freezing mixture, and then expose it to the atmosphere till it began to liquefy. His apparatus for this purpose is represented Plate CLXXXIX. *A* is a large funnel filled with a solid mass of ice. *B*, a cavity in the middle of this ice, formed part of the way by scraping with a knife, and for the remaining part by boring with a hot iron wire. *C*, one of the thermometer-pieces, serves for the heated body, and rests on a coil of brass-wire: it had been previously burnt with a strong fire, that there might be no danger of its suffering any farther diminution of bulk by being heated again for those experiments. *D*, a cork stopped in the orifice of the funnel. *E*, the exterior vessel, having the space between the sides and its included funnel *A* filled with pounded ice as a defence to the ice in the funnel. *F*, a cover for this exterior vessel, filled with pounded ice for the same purpose. *G*, a cover for the funnel, filled also with pounded ice, with perforations in the bottom for allowing the water to pass from this ice down to the funnel. The thermometer piece was heated in boiling water, taken up with a small pair of tongs equally heated, dropped instantly into the cavity *B*, and the covers put on as expeditiously as possible; the bottom of the funnel being previously corked, that the water might be detained till it should part with all its heat, and likewise to prevent the water from the other ice, which ran down on the outside of the funnel, from mingling with it. After standing about 10 minutes the funnel was taken out, wiped dry, and uncorked over a weighed cup: the water that ran out weighed 22 grains. On repeating the experiment the water weighed only 12 grains; and on a third trial, in which the piece was continued much longer in the cavity, the liquid did not amount to three drops. To his surprise Mr Wedgewood also now found the piece frozen to the ice so that it could not easily be got off, though all the ice was at the beginning of the experiment in a thawing state.

On heating the piece again to 60° of his thermometer (1857 of Fahrenheit), and throwing some fragments of ice over it, he found that in about half an hour the water amounted to 11 pennyweights. On stopping the funnel, replacing the covers, and leaving the whole about seven hours, he found, that a considerable quantity of water was collected; but it ran out so slowly, that he imagined something had stopped the narrow end of the funnel: but on examining the state

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of the ice, he found that the fragments he had thrown over the thermometer-piece were entirely frozen together, and in such a form that it was evident they could not have assumed it without fresh water having been superadded and thrown upon them, the cavities between them being partly filled with new ice. This was so strongly cemented, that he could scarcely get it out with the point of a knife, and great part of the coiled wire was found enveloped in the new ice. The passage through the ice to the stem of the funnel, which had been made pretty wide with a thick iron wire, was so nearly shut up, that the slow draining of the water was now very easily accounted for; this draining of the water indeed being the only sign of any passage at all. On taking the ice out of the funnel, and breaking it to examine this canal, he found it almost entirely filled up with ice projecting from the solid mass in crystalline forms, similar in appearance to the crystals we often meet with in the cavities of flints and quartzose stones. A coating of ice was also found on the outside of the funnel perfectly transparent, and of a considerable extent, about the $\frac{1}{10}$ th of an inch thick: this coating enveloped also a part of the funnel which was not in contact with the surrounding ice, the latter being melted to the distance of an inch from it. Some of the ice being scraped off from the inside of the funnel and applied to the bulb of the thermometer, the mercury sunk from 50° to 32°, and continued at that point till the ice was melted; after which the water being poured off, it rose in a little time to 47°.

Astonished at these appearances, our author determined to repeat the experiment with some pieces of ice he had stored up in a cellar; but on going thither, he found the cask of ice itself in a similar situation to that made use of in his experiments. Though much of it was melted, yet the fragments were frozen together, so that it was with difficulty that any pieces could be broken or got out with an iron spade; and when so broken, it had the appearance of Breccia marble, or plum-pudding stone; the fragments having been broken and rammed into the cask with an iron mallet. A porcelain cup being laid upon some of this ice about half an hour, in a room whose temperature was 50°, it was found pretty firmly adhering; and when pulled off, the ice exhibited an exact impression of the fluted part of the cup with which it had been in contact; so that the ice must necessarily have been liquefied first, and afterwards congealed. This was several times repeated with the same event. Fragments of the ice were likewise applied to one another, to sponges, pieces of flannel, and linen cloth, both moist and dry: all these in a few seconds began to cohere; and in about a minute were frozen so as to require some force to separate them. After standing an hour, the cohesion was so firm, that on pulling away the fragments of ice from the woollen and sponge, they tore off with them that part of the surface with which they were in contact; though at the same time both the sponge and flannel were filled with water which that very ice had produced.

The power of the congelation was stronger on the sponge and woollen than on linen; and to estimate its force, a piece of ice was applied to a bit of dry flannel weighing two pennyweights and an half, surrounding them at the same time with other ice. After lying together

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together three quarters of an hour, he found that a weight of five ounces was necessary to separate them, though so much of the ice had liquefied that the weight of the flannel was increased by more than 14 pennyweights. The piece of ice was then weighed, put to the flannel a second time, and left in contact with it for four hours; at the end of which time they were found so firmly frozen together, that 78 ounces were required for their separation, although from 42 pennyweights of the ice 15 more had melted off: the surface of contact was at this time about a square inch. Continuing them in contact for 7 hours longer, they only bore 62 ounces, the ice being diminished to 14 pennyweights, and the surface of contact reduced to about $\frac{6}{7}$ ths of an inch square.

6
Water ab-
sorbed by
solid ice."

On trying whether masses of ice apparently solid would absorb water, he found that they did so in considerable quantity; for on heating some of his thermometer pieces, and laying them on pieces of ice, in which they made considerable cavities, he always found the water absorbed as fast as it was produced, leaving both the piece and the cavity dry.

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Thus was our author convinced, that, in his experiments, the two seemingly opposite processes of nature, congelation and liquefaction, went on together at the same time, in the same vessel, and even in the same piece of ice. To account for such an extraordinary phenomenon, he had recourse to two different theories. One was, that water, when highly attenuated, and resolved into vapour, may freeze with a less degree of cold than water in its aggregate or grosser form: whence hoar frost is observed on grass, trees, &c. at times when there is no appearance of ice upon water, and when the thermometer is above the freezing point; which seems also to have been the opinion of Boerhaave, as he places the freezing of vapour, or even of water when divided by absorption in a linen cloth, at 33° . "Now (says Mr Wedgwood), as the atmosphere abounds with watery vapour, or water dissolved and chemically combined, and must be particularly loaded with it in the neighbourhood of melting ice; as the heated body introduced into the funnel must necessarily convert a portion of the ice or water into vapour; and as ice is known to melt as soon as the heat begins to exceed 32° , or nearly one degree lower than the freezing point of vapour; I think we may from hence deduce pretty satisfactorily all the phenomena I have observed. For it naturally follows from these principles, that vapour may freeze where ice is melting; that the vapour may congeal, even upon the surface of melting ice itself; and that the heat which, according to the ingenious theory of Dr Black, it emits in freezing, may contribute to the further liquefaction of that very ice upon which the new congelation is formed.

"I would further observe, that the freezing of water is attended with plentiful evaporation in a close as well as in an open vessel; the vapour in the former condensing into drops on the under side of the cover, which either continue in the form of water, or assume that of ice or a kind of snow, according to circumstances; which evaporation may perhaps be attributed to the heat, that was combined with the water, at this moment rapidly making its escape, and carrying part of the aqueous fluid off with it. We are hence furnished with a fresh and continual source of vapour

as well as heat: so that the processes of liquefaction and congelation may go on uninterruptedly together, and even necessarily accompany one another; although, as the freezing must be in an under proportion to the melting, the whole of the ice must ultimately be consumed.

Evapora-
tion.

"Some other circumstances may be taken notice of in the coating of ice on the outside of the throat of the funnel. Neither the cover of the outer vessel, nor the aperture in its bottom which the stem of the funnel passed through, were air-tight; and the melting of the surrounding ice had left a vacancy about an inch round that part of the funnel on which the crust had formed. As there was therefore a passage for air through the vessel, a circulation of it would probably take place; the cold and dense air in the vessel would descend into the rarer air of the room, then about 50° , and be replaced by air from above. The effect of this circulation and sudden refrigeration of the air will be a condensation of part of the moisture it contains upon the bodies it is in contact with; the throat of the funnel being one of these bodies, must receive its share; and the degree of cold in which the ice thaws being supposed sufficient for the freezing of this moist vapour, the contact, condensation, and freezing, may happen at the same instant. The same principles apply to every instance of condensation that took place in these experiments; and the congelation was evidently strongest in those circumstances where vapour was most abundant, and on those bodies which from their natural or mechanic structure were capacious of the greatest quantity of it; stronger, for instance, on sponge than on woollen, stronger on this than on the closer texture of linen, and far stronger on all of these than on the compact surface of porcelain."

The second theory proposed by our author for solving the phenomena in question is founded entirely on the principles of evaporation. "If nevertheless (says he) the principle I have assumed, that water highly attenuated will congeal with a less degree of cold than water in the mass, should not be admitted; another has above been hinted at, which experiments have decidedly established, from which the phenomena may perhaps be equally accounted for, and which, even though the other also is received, must be supposed to concur for some part of the effect: I mean, that evaporation produces cold; both vapour and steam carrying of some proportion of heat from the body which produces them. If therefore evaporation be made to take place upon the surface of ice, the contiguous ice will thereby be rendered colder; and as it is already at the freezing point, the smallest increase of cold will be sufficient for fresh congelation. If ice is producible by evaporation in the East Indies*; where natural ice is never seen; we need not wonder that congelation should take place where the same principle operates amidst actual ice. * See *Climate*.

"It has been observed above, that the heat emitted by the congealing vapour probably unites with and liquefies contiguous portions of ice: but whether the whole, either of the heat so emitted, or of that originally introduced into the funnel, is thus taken up; how often it may unite with other portions of ice, and be driven out from other new congelations; whether there exists any difference in its chemical affinity or elective attraction to water in different states, and the

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Euclid.

contiguous bodies; whether part of it may not ultimately escape, without performing the office expected from it upon the ice; and to what distance from the evaporating surface the refrigerating power may extend; must be left for further experiments to determine."

EVASION, in law, is used for any subtle endeavour to set aside truth, or to escape the punishment of the law, which will not be endured. Thus, if a person says to another that he will not strike him, but will give him a pot of ale to strike him first, and accordingly he strikes, the returning of it is punishable; and if the person first striking be killed, it is murder; for no man shall evade the justice of the law by such a pretence to cover his malice.

EVATES, a branch or division of the druids, or ancient Celtic philosophers. Strabo divides the British and Gaulish philosophers into three sects; bards, evates, and druids. He adds, that the bards were the poets and musicians; the evates, the priests and naturalists; and the druids were moralists as well as naturalists. But Marcellus and Hornius reduce them all to two sects, viz. the **BARDS** and **DRUIDS**.

EUBAGES, an order of priests or philosophers among the ancient Celtæ or Gauls: some will have the eubages to be the same with the druids and saronidæ of Diodorus; and others, that they were the same with what Strabo calls **EVATES**.

EUBŒA (anc. geog.), an oblong island, stretching out between Attica and Thessaly, opposite to Bœotia; from which it is separated by a narrow strait called *Euripus*. This island, never exceeding 40, nor ever falling short of two miles in breadth, is in length 150 miles, and in compass 365, according to Pliny. Now **NEGROPONT**, from its principal town, which was anciently called *Chalcis*.

EUCCHARIST, the sacrament of the Lord's supper, properly signifies *giving thanks*.—The word in its original Greek, *Εὐχαριστία*, literally imports *thanksgiving*; being formed of *εὖ*, *bene*, "well," and *χαρίν*, *gratia*, "thanks."

This sacrament was instituted by Christ himself, and the participation of it is called *communion*.

As to the manner of celebrating the eucharist among the ancient Christians, after the customary oblations were made, the deacon brought water to the bishops and presbyters, standing round the table, to wash their hands; according to that of the psalmist, "I will wash my hands in innocency, and so will I compass thy altar, O Lord." Then the deacon cried out aloud, "Mutually embrace and kiss each other;" which being done, the whole congregation prayed for the universal peace and welfare of the church, for the tranquillity and repose of the world, for the prosperity of the age, for wholesome weather, and for all ranks and degrees of men. After this followed mutual salutations of the minister and people; and then the bishop or presbyter having sanctified the elements by a solemn benediction, he brake the bread, and delivered it to the deacon, who distributed it to the communicants, and after that the cup. Their sacramental wine was usually diluted or mixed with water. During the time of administration, they sang hymns and psalms; and having concluded with prayer and thanksgiving, the people saluted each other with a kiss of peace, and so the assembly broke up.

EUCHITES, or **EUCHITÆ**, a sect of ancient he-

retics, who were first formed into a religious body towards the end of the fourth century, though their doctrine and discipline subsisted in Syria, Egypt, and other eastern countries before the birth of Christ; they were thus called because they prayed without ceasing, imagining that prayer alone was sufficient to save them. Their great foundation were those words of St Paul, (Thessalonians v. 17.), *Pray without ceasing*. The word is formed of the Greek, *εὐχὴ* *prayer*, whence *εὐχισταί*, the same with the Latin, *precatores*, "prayers." They were also called *Enthusiasts* and *Messalians*; a term of Hebrew origin, denoting the same as Euchites.

The Euchites were a sort of mystics who imagined, according to the oriental notion, that two souls resided in man, the one good and the other evil; and who were zealous in expelling the evil soul or demon, and hastening the return of the good spirit of God, by contemplation, prayer, and singing of hymns. They also embraced the opinions nearly resembling the Manichean doctrine, and which they derived from the tenets of the oriental philosophy. The same denomination was used in the 12th century, to denote certain fanatics who infested the Greek and Eastern churches, and who were charged with believing a double Trinity, rejecting wedlock, abstaining from flesh, treating with contempt the sacraments of baptism and the Lord's supper, and the various branches of external worship, and placing the essence of religion solely in external prayer, and maintaining the efficacy of perpetual supplications to the supreme Being for expelling an evil being or genius, which dwelt in the breast of every mortal. This sect is said to have been founded by a person called *Lucopetrus*, whose chief disciple was named *Tychicus*. By degrees it became a general and invidious appellation for persons of eminent piety and zeal for genuine Christianity, who opposed the vicious practices and insolent tyranny of the priesthood; much in the same manner as the Latins comprehended all the adversaries of the Roman pontiff under the general terms of **WALDENSES** and **ALBIGENSES**.

St Cyril of Alexandria, in one of his letters, takes occasion to censure several monks in Egypt, who, under pretence of resigning themselves wholly to prayer, led a lazy, scandalous life. A censure, likewise applicable to monasteries in general.

EUCHOLOGIUM, *Εὐχολόγιον*, a Greek term, signifying literally *a discourse on prayer*. The word is formed of *εὐχὴ* *prayer*, and *λόγος* *discourse*.

The Euchologium is properly the Greek ritual, wherein are prescribed the order and manner of every thing relating to the order and administration of their ceremonies, sacraments, ordinations, &c.

F. Goar has given us an edition of the Greek Euchologium in Greek and Latin, with notes, at Paris.

EUCLID of **MEGARA**, a celebrated philosopher and logician, flourished about 400 B. C. The Athenians having prohibited the Megarians from entering their city on pain of death, this philosopher disguised himself in women's clothes to attend the lectures of Socrates. After the death of Socrates, Plato and other philosophers went to Euclid at Megara, to shelter themselves from the tyrants who governed Athens. Euclid admitted but one chief good; which he sometimes called *God*, sometimes *Spirit*, and sometimes *Providence*.

EUCLID of *Alexandria*, the celebrated mathematician,

Eucrasy,
Eudiometer.

cian, flourished in the reign of Ptolemy Lagus, about 277. B. C. He reduced all the fundamental principles of pure mathematics, which had been delivered down by Thales, Pythagoras, Eudoxus, and other mathematicians before him, into regularity and order, and added many others of his own discovering; on which account he is said to be the first who reduced arithmetic and geometry into the form of a science. He likewise applied himself to the study of mixed mathematics, and especially to astronomy, in which he also excelled. The most celebrated of his works is his Elements of Geometry, of which there have been a great number of editions in all languages; and a fine edition of all his works was printed in 1703, by David Gregory, Savilian professor of astronomy at Oxford.

EUCRASY, (of *in well*, and *proper temperature*), in medicine, an agreeable well proportioned mixture of qualities, whereby a body is said to be in good order and disposed for a good state of health.

EUDIOMETER, an instrument for observing the purity of the atmospheric air, or the quantity of pure dephlogisticated or vital air contained in it, chiefly by means of its diminution on a mixture with nitrous air*. Several kinds of these have been invented, the principal of which are the following.

* See Aerology, n^o 60, 154

Dr Priestley's eudiometer.

I. The eudiometer originally used by Dr Priestley is a divided glass tube, into which, after having filled it with common water, and inverted it into the same, one or more measures of common air, and an equal quantity of the nitrous kind, are introduced by means of a small phial, which is called the *measure*; and thus the diminution of the volume of the mixture, which is seen at once by means of the graduations of the tube, instantly discovers the purity of the air required.

Landriani's eudiometer.

II. The discovery of this property of nitrous air and the eudiometer by Dr Priestley, soon produced various attempts to improve on the principle, and construct more elegant and accurate machines for discovering the smallest inequality in the constitution of the atmosphere. The first of these was contrived by Mr Landriani; an account of which is published in the sixth volume of M. Rosier's Journal for the year 1775. It consists of a glass tube, fitted by grinding to a cylindrical vessel, to which are joined two glass cocks and a small basin; the whole being fitted to a wooden frame. Quicksilver is used in this instrument instead of water; but the use of that fluid occasions an inconvenience, because the nitrous air acts upon the metal, and renders the experiment ambiguous.

Inconvenience attending its use.

Magellan's first eudiometer.

III. In 1777 Mr Magellan published an account of three eudiometers invented by himself. The first of these, represented Plate CLXXXVI. fig. 1. consists of a glass tube *MD*, about 12 or 15 inches long, and quite cylindrical throughout, having the upper orifice closed with a ground-glass stopple *M*. A vessel *C* is joined to the lower part of the tube, and likewise well adapted by grinding. This vessel has three necks, as represented in the figure: one of which serves to join it to the tube *M*; the other two are ground to those of the phials *A* and *B*, whose capacities must be as equal as possible, as well to each other as to the tube *MD*. *Z* represents a brass ring which slides up and down the tube *MD*, and by a finger-screw may be tightened or slackened at pleasure, and set to any place upon it. *G* is a brass or wooden ruler divided into

equal parts, with two semicircular brass pieces, by which it may be easily applied and kept near the glass tube *MD*, as is shown at *F*; where it must be kept close to the neck, or upper extremity of the tube, by the notch *I*. In using this instrument, we must first remove the stopple *M*, after which the instrument is to be entirely filled with water by dipping it in the tub. The stopple is then to be replaced; taking care that no bubble of air may remain either in the tube, the vessel *C*, or the two phials *A B*. The lower part of the instrument, viz. about as far as the middle of the tube, must then be kept under water, and one of the phials *A* or *B*, now filled with water, is to be removed from the neck of the vessel *C*, and filled with the air of which we design to try the purity, in the manner directed under the article *GAS*; after which it is to be replaced into the neck of the vessel *C*; and in like manner the other phial must be filled with nitrous air, and replaced in the other neck. Taking the instrument then out of the water, the vessel *C* must be turned with the bottom upwards, as represented at *F*; in which case, the two elastic fluids contained in the phials will ascend into the vessel *C*; where, mixing together, the diminution will be effected. But as soon as the vessel is turned round, the instrument must be plunged in water as far as about the middle of the tube, and the stopple *M* removed. As the bulk of the two elastic fluids diminishes, the water in the tube *MD* descends. This instrument is subject to some errors, arising from the greater or lesser height of the column of water in the tube *MD*, as it is held more or less perpendicular; it may also vary by the very act of putting in the stopple *M*. Another and still greater fault is, that it cannot admit but one measure of nitrous to one of common air, which is a very uncertain method of estimating the purity of a given kind of respirable air. The divisions on the scale are likewise too large, and it does not seem capable of any great accuracy.

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Inaccuracy of this instrument.

The second kind of eudiometer constructed by M. Magellan is represented fig. 2. and consists of a glass tube *TC*, two or three feet long, and having a cavity as nearly cylindrical as possible. One of the ends, *C*, is bent forwards as represented in the figure; the other at *T* is open, and may terminate in a funnel, to obviate the necessity of using a separate one. The whole tube is fastened by means of two loops to the brass scale *CWN*. *N* is a glass phial, having its neck *V* ground air-tight to the inside of the end of the tube *T*; the whole-phial containing one half of what the tube *TC* is capable of containing; but the phial *ABC*, at the other end, must contain three or four times the quantity that *N* can contain; and the neck of it must also be ground air-tight to the end *C* of the tube. The scale *CWTV* is divided into 128 parts, the divisions being set from *T* towards *C*; and the cavity of the tube between the first and last of them being double the capacity of the phial *N*. *XR* is a tin-vessel, which may serve as a case for packing the whole instrument and its appendages; as also for a trough for holding water when experiments are to be made. The glass tube *gh*, and the glass stopple *M*, are both ground air-tight to the mouth *V* of the tube, in order to be put into it occasionally. To use this kind of eudiometer, let the instrument be immersed under water in the tin-vessel;

6
His second eudiometer.

Eudiometer.

vessel; then let the phial *N*, when filled with water, be put into *CED*, the inside socket of the tin-vessel. Fill it then with nitrous air; and let this quantity be thrown into the phial *ABC*, which is to be fixed somewhat tight to the mouth *C* of the eudiometer. The same phial *N* is afterwards filled with the air of which we wish to try the quality; and raising the end of the instrument *C*, it is then put into the mouth *V*. The instrument is then to be placed upright as in the figure, by hanging it on the hook *W*; and as soon as this last air goes up to the phial *ABC*, the phial *N* is to be taken off, that the diminution of the two mixed airs may be supplied from the water in the tin-vessel: the mouth *V* of the eudiometer being all this time held under water. The bent tube *gb*, having the brass ring *K* fitted to it, is then put to the lower end *V* of the eudiometer. By observing the surface of the water in the small tube, which thus forms a true syphon with the tube of the instrument, and by means of the brass ring *K*, the stationary state of diminution in the mixture may be distinguished; which being ascertained, the small tube *gb* is taken off from the eudiometer, and the whole instrument laid down for some minutes in the water of the tin-vessel; after which the mouth *V* is to be shut up with the glass-stopper *M*; and, reversing the instrument, it is hanged up by the end *V* upon the hook *W*. By this position the whole diminished air of the vessel *ABC* goes up to the top, where its real bulk is shown by the scale facing the inside surface of the water. This number being deducted from 128, gives the comparative wholeness of the air already tried without any farther calculation. "But this process (says Mr Magellan) will be still easier, when the last diminution of the two kinds of air is only required in the observation; because no use will then be made of the syphon. In such a case the instrument is left hanging on the hook *W* for 48 hours; after which it is laid down under the water of the trough in an horizontal position for 8 or 12 minutes, in order to acquire the same temperature with the water: the mouth *V* is then shut up with the stopple *M*; the instrument is hung by the end *V* in a contrary position; and the last real bulk of the good mixed air will then be shown by the number of the brass scale answering to the inside surface of the water.

7
His third
eudiometer.

IV. The third eudiometer constructed by Mr Magellan is represented fig. 3. where *EN* represents an uniformly cylindrical glass-tube about two or three feet long, with a large ball *S* and a glass stopple *M*, fitted air-tight to the mouth *N*, which ought to be wide and funnel-shaped, unless a separate funnel is made use of. *KL* is a small syphon with a brass ring *X*; *Z* a small phial, the contents of which do not exceed one third of the ball *S*, or one half of the glass tube. Lastly, the instrument has a ruler *L*, divided and stamped like the scale already mentioned, with a glass funnel, which is ground to the mouth *N* of the instrument, when this is not funnel-shaped as above directed. When this eudiometer is to be made use of, it must be filled with water, and set in a vertical position, with

Eudiometer.

the mouth *N* under the surface of the water in a tub or trough. The phial *Z* is to be filled with nitrous air, and thrown into the tube by means of a glass funnel, if the mouth of the eudiometer tube be not sufficiently wide to answer the purpose. The same phial *Z* is then to be filled with the air to be tried; after which the syphon *KL* is to be immediately added to the mouth *N* of the eudiometer under the surface of the water, some of which is to be poured into it. The stationary moment of the greatest diminution of the two airs is watched by means of the ring *X*; and, when that moment arrives, the syphon *KL* is to be taken off; the eudiometer is laid for some minutes under water in an horizontal position or nearly so; but taking care that none of the inclosed air may escape: the mouth *N* is then shut up with the glass stopple *M*, and the instrument is inverted with the mouth *N* upwards. Lastly, the space occupied by the residuum of the diminished air is measured by applying to its side the divided ruler or scale, and the result is estimated as has been already explained.

On all these eudiometers it is very obvious to remark, that they are complicated and difficult to be used; and it is besides no easy matter to get them made with the requisite accuracy. Mr Cavallo observes also, that the construction of all the three is founded on a supposition that the mixture of nitrous and atmospherical air, after having continued for some time to diminish, increases again; but he informs us that this is a mistake, and that Mr Magellan himself owned it to be so. But the worst of all is, that they are by no means accurate, as appeared from several experiments made by Mr Magellan in Mr Cavallo's presence, with air taken out of the window of the room where the experiments were performed. By the first trial, the diminution was 48 parts out of 132 of the mixture: on a second trial, the same elastic fluids being still used, the diminution was 58 parts out of 132: on a third trial, the diminution was again 48; and by a fourth one, it was 51. Nay, Mr Magellan himself owned that, after many experiments with his eudiometers, he never could obtain any constant result, even when the nitrous and common air which he made use of were precisely of the same quality.

V. A preferable method of discovering the purity of the air by means of an eudiometer is recommended by M. Fontana; of which Mr Cavallo says, that its accuracy is such as could scarce be believed by those who have not had an opportunity of observing it. The instrument is originally nothing more than a divided glass tube, though the inventor afterwards added to it a complicated apparatus, which, in Cavallo's opinion, was altogether useless. The first simple eudiometer consisted only of a glass tube, as uniformly cylindrical as possible in its cavity, about 18 inches long, and $\frac{1}{4}$ ths of an inch in diameter in the inside, hermetically sealed at one end (A). The outside of this tube was marked with a diamond, or had circles drawn round it at the distance of three inches from one another, beginning at the closed end of the tube; or at such distances

(A) To observe whether the cavity of a glass tube is perfectly cylindrical, pour into it at different times equal quantities of mercury or water, one upon the other; observing each time, by means of a divided ruler, if those equal quantities of liquor fill equal lengths of the tube.

Eudiometer.

10
This instrument for measuring a quantity of air exactly.

11
Method of using this eudiometer.

stances as are exactly filled by equal measures of elastic fluids. When the parts of these divisions were required, the edge of a ruler, divided into inches and smaller parts, was held against the tube; so that the first division of the ruler might coincide with one of the marks on the tube. The nitrous and atmospherical air are introduced into this tube, in order to be diminished, and the purity of the atmospherical air thus ascertained; but that an equal quantity of elastic fluid may always be certainly introduced, M. Fontana contrived the following instrument as a measure, which cannot be liable to any error. It is represented fig. 4, and consists of a glass tube *AB*, about two inches long and one in diameter, closed at the end *A*, and having a brass piece *BCDE* cemented on the other, containing a sliding door *D*; which when pushed into its proper cavity, shuts the mouth of the tube or measure *AB*; and when pulled out, as represented in the figure, opens it. To prevent it from being pulled out entirely, a spring *E* is screwed upon the flat part of the brass piece, the extremity of which bears upon the head of a brass pin, which passing through a hole, rubs against the door *D*; and when this is pulled nearly out, the pin, falling into a small cavity, prevents it from coming quite out. The diameter of the brass piece is nearly the same with that of the glass tube *AB*; and near its mouth *C* there are two notches made with a file.

Under the same figure the cavity of the brass piece and the parts of the measure are shown separately, viz. *a*, the glass tube; *b*, the brass piece; *c*, the sliding brass door inverted in such a manner as to exhibit the cavity for the pin; *d*, the pin with the spring and small screw. The inside surface of this measure, as well as of the long tube, should have the polish taken off by rubbing with emery; as this prevents the water, when the experiments are made, from adhering to it in drops, and thus the measurements will be more exact.

To use this apparatus, the long tube must be filled with water; and being inverted in the tub of water described under the article Gas, furnished with a shelf, the measure, being also filled with water, is inverted over an hole in the shelf; and in order to fill it with the elastic fluid required, a phial containing it is brought under the hole; where being inclined a little, part of the gas escapes and passes into the measure. The water then escapes through the notches *ss*, made with the file in the mouth of the measure, as already mentioned (*B*). The door of the measure is then shut by pushing it in as far as it will go; and the measure, being drawn off from the shelf, but still kept under water, is turned with the mouth upwards; by which means the superfluous quantity of elastic fluid, remaining in the cavity of the brass piece by reason of its being separated by the sliding piece, escapes, and has its place occupied by water. The measure being then again inverted with its mouth downwards, is set any where on the shelf of the tub; the long tube put over the hole of the shelf, and the air transferred from the measure to this tube, as has already been directed for filling the measure itself.

When M. Fontana made use of this eudiometer, he commonly threw in two measures of respirable air into the tube; then he added one measure of nitrous air: but as soon as the latter was entered, he removed the tube from the shelf, holding it by the upper end, and agitating it for about 20 seconds in the water. The tube was then rested upon the side of the tub, while the measure was again filled with nitrous air; then putting the tube upon the shelf, and holding it as nearly perpendicular as he could, he applied the divided edge of the ruler to it, in order to observe the diminution of the two fluids. After this he threw in a fourth measure of nitrous air; and after shaking and letting it rest for some time, he observed again the diminution of the two elastic fluids.

"That this method (says Mr Cavallo) should be very accurate, may perhaps appear somewhat mysterious; but the mystery will soon vanish, if it be considered that the accurate result depended not so much on the particular construction of the instrument, as on the regular management of it and uniformity of the operation. The exactness of the measure indeed contributed a great deal; but M. Fontana observed, that with exactly the same quantities of nitrous and common air, very different results could be occasioned by their being left a longer or shorter time before the instrument was agitated, or by being agitated much or little, as well as several other circumstances, which to a superficial observer would appear to be of little consequence. He therefore performed the operation always in a similar manner, viz. by agitating the tube always for the same length of time, and always with equal quickness; by which means, when the same elastic fluids were used, the results of the experiments were so nearly the same, that the difference, if any could be observed, might be neglected without any impropriety."

Notwithstanding the accuracy of this instrument, however, M. Fontana found that it was still liable to some small errors arising from the following sources. 1. The elastic fluid within the tube, when the greatest part of it is filled with water, and the tube is kept out of the water excepting its mouth, is not of the same density with the outward or atmospherical air, on account of the pillar of water in the tube; which, according as it is longer or shorter, counterbalances more or less the pressure of the atmosphere upon the quantity of elastic fluid contained in the upper part of the tube; which quantity of elastic fluid of consequence occupies a greater or less space in the tube, according to the greater or less pressure it endures. This error, however, becomes insensible when the column of water is very short, and the surface of the water on the outside coincides nearly with that on the inside of the tube. 2. The difficulty of keeping the instrument perpendicular in the act of measuring the diminution. And, 3. The still greater difficulty of observing with what division of the ruler the surface of the water within the tube coincided.

To avoid these errors, M. Fontana made use of the following contrivance. *AAAA*, fig. 5. represents a strong glass tube about 3 inches diameter, and 18 inches

Eudiometer.

12
Why this eudiometer is so accurate.

13
Is still liable to some small errors.

14
Fontana's method of avoiding these errors.

(B) The measure would be filled with elastic fluid though these notches were not made, but not so readily, because the water could not easily get out.

Eudiometer.

inches long, with a foot of glass all made of one piece. Within about an inch of the mouth of this tube a brass ring is fastened, which contains two brass rings moveable upon opposite centres, in the same manner that sea-compasses are usually suspended, and which are commonly called *gingles*. *CCCC* represents the measuring tube or eudiometer; which is exactly the same with that already described, having lines marked upon its outside surface to show the spaces occupied by equal measures of elastic fluid. The scale *BB* is adapted to this tube, which is shown separately in fig. 6. It consists of two brass slips *AC*, *AG*, connected by two brass rings *AA*, *CC*, through which the eudiometer tube passes. To the lowest of these rings a perforated brass piece *BB*, furnished with cross pins or pivots, is screwed; and, by means of longitudinal cuts, its lower extremity is rendered springy; so that when all the piece *AB*, *AB* is put upon the eudiometer tube, the latter cannot slip from within the former, unless the operator forces it. When the eudiometer tube, with the scale, &c. is put together, as represented fig. 5. the cross pins of the piece *BB*, fig. 6. rest upon the inner ring of the gingle at *AA*, fig. 5. by which means the tube *CCCC* is kept perpendicular within the tube *AAAA*, provided this latter be situated so nearly perpendicular that the former may not touch the side of it, which would prevent it from acquiring the position desired. One of the brass slips *AC*, fig. 6. is divided into equal parts; 100 of which are equivalent to the space between two of the marks on the eudiometer tube *CCCC*, fig. 5. and consequently show the parts of a measure. These divisions are numbered from the upper edge of the lower ring connecting the two brass slips, *AC*, *AG*.

When this instrument is to be used, one or more measures of respirable air are thrown into the eudiometer tube; a measure of nitrous air is then added; and after shaking the tube for some time, it must be introduced into the large tube *AAAA*, which for this purpose must be plunged into the water of the tub; for the mouth of the eudiometer tube must not at present be taken out of the water. After it has been introduced into the large tube, the whole is taken out of the water, and set upon the shelf or a table. Now the large tube *AAAA* is filled with water, and the eudiometer tube suspended perpendicularly in it by means of the cross pins or pivots of the brass piece annexed to the scale, which rests upon the inner ring of the gingle. The operator must then slide the tube *CCCC* up and down through the scale and brass piece, &c. till the surface of the water within the tube coincides exactly with the upper edge of the lower ring that connects the two brass slips of the scale piece, which may be done very accurately by means of a magnifying glass. The surface of the water within the eudiometer is concave; and when viewed horizontally, it appears like a dark line or limit exceedingly well defined; so that the middle or lowermost point of it may be made to coincide with the edge of the brass ring with great precision, except when some drops of water hang on the outside of the tube, which should therefore be wiped off.

Having ascertained this point, we must next observe which division of the scale coincides with one of the circular divisions marked upon the glass tube *CCCC*;

which will show the parts of a measure. Thus suppose, that when the eudiometer tube is fixed, so that the surface of the water in it coincides perfectly with the edge of the lower brass ring, viz. with the beginning of the divisions; that the 70th division of the scale falls upon the first circular mark, as represented in the figure; then it is plain, that the quantity of elastic fluid contained in the tube is equal to one measure and 70 hundredth parts more. This being observed, and the large tube again immersed in the water, the eudiometer-tube is removed from it, but always taking care that its mouth be not lifted up above the surface of the water. Another measure of nitrous air must now be introduced into the eudiometer-tube; which, after being agitated as already directed, is to be put into the large tube *AAAA*. The whole is then taken out of the water, and the diminution of the elastic fluid observed as above directed.

Thus the eudiometer tube is kept quite perpendicular, and the pillar of water in it rendered very short, not exceeding half an inch at most. It is easy to perceive, however, that if the operator, when furnished with the eudiometer-tube only, keeps it so far immersed in the water of the tube when he observes the divisions, that the water within the tube may be nearly equal with the edge of the tub; the large tube *AAAA* may be spared, and the operation will thus become much more easy and expeditious. Little difference can happen from the position of the tube; because the brass ring ascertains the position of the water so well, and the difference occasioned by a few degrees deviation from the true perpendicular is so small, that it can scarce be perceived.

VI. M. Sauffure of Geneva has invented an eudiometer, which he supposes to be more exact than any of those hitherto described. His apparatus consists of the following parts. 1. A cylindrical glass bottle with a ground stopple, capable of containing about five ounces and an half, and which serves as a receiver for mixing the two airs. 2. A small glass phial, whose capacity is nearly equal to one third of that of the recipient, and serves for a measure. 3. A small pair of scales which may weigh very exactly. 4. Several glass bottles for containing the nitrous or other air to be used, and which may supply the place of the recipient when broken. The whole of this apparatus may be easily packed into a box, and thus transported from place to place, and even to the summits of very high mountains. The method of using it is as follows.

1. The receiver is to be filled with water, closed exactly with its glass stopper, wiped on the outside, and weighed very exactly. Being then immersed in a vessel full of water, and held with the mouth downwards, the stopple is removed, and, by means of a funnel, two measures of common and one of nitrous air are introduced into it one after another: these diminish as soon as they come into contact; in consequence of which the water enters the recipient in proportionable quantity. After being stoppered and well shaken, to promote the diminution the receiver is to be opened under water; then stoppered and shaken, and so on for three times successively. At last the bottle is stoppered under water, taken out, wiped very clean and dry, and weighed exactly as before. It is plain, that now when the bottle is filled partly with elastic fluid and partly with

Eudiometer.

15

with

Eudiometer.

16
Inconveniences and errors to which this machine is liable.

17
Mr Cavallo's eudiometer.

with water, it must be lighter than when quite full of water; the weight of it then being subtracted from the former, the remainder shows that quantity of water which would fill the space occupied by the diminished elastic fluid. Now, in making experiments with airs of different degrees of purity, the above mentioned remainder will be greater when the diminution is less, or when the air is more impure, and *vice versa*; and thus the comparative purity between two different kinds of airs may be determined.

On this method it is obvious to remark, that notwithstanding the encomiums bestowed on it by the inventor, it is subject to many inconveniences and errors, principally arising from the inaccuracy of the measure, and the difficulty of stopping the bottle without occasioning a pressure upon the contained elastic fluid, which being variable, must occasion some error in the weight of the bottle.

VII. To avoid the inconveniences to which all these instruments are subject, Mr Cavallo employs a glass tube with its scale and measure, such as is represented fig. 5. the length of the tube being about 16 or 17 inches, and between $\frac{1}{2}$ and $\frac{3}{4}$ of an inch in diameter, and of as equal a bore as possible throughout; having one end sealed hermetically, and the other shaped like a funnel, though not very wide. The whole of this apparatus is represented fig. 7, where *AB* is the glass tube, to the upper end of which a loop *AEC* should be fastened, made of waxed silk-lace, with several cross threads *CC*, *DD*, *EE*, &c. in order to suspend the instrument to a hook *AB*, fig. 8. which should either be fastened to that side of the tube opposite to the shelf, or so constructed that it may be easily fixed and removed again as occasion requires; or it may be made of thick brass wire, the lower extremity of which fits a hole made in the side of the tub. The brass piece with the scale, which slides upon the eudiometer, is formed of two brass slips *FG*, *HI* (fig. 7.), joined by two brass rings, to which they are soldered. One hundred divisions are marked upon one of those brass slips, beginning from the upper edge of the lower ring *GI*, and all together equal to the space contained between two of the marks or measures made upon the glass tube; so that they show the parts of a measure. An hundred divisions are likewise marked upon the other brass slip *HI*, beginning from the lower edge of the upper ring *FH*.—The following directions are given by Mr Cavallo for marking these divisions. “When the tube *AB* is filled with water, a measure of air should be thrown into it in the manner already directed: the tube must then be suspended to the hook by the loop, as represented fig. 8, so high, that the surface of the water within the tube may be very near the surface of the water in the tub, two inches, for instance, above it; then looking horizontally through the tube, a mark should be made by sticking a bit of soft wax upon the tube, just coinciding with the lower part of the surface of the water within it; in which place afterwards a circular mark should be made with the edge of a flint, or with a piece of agate or diamond, but not so deep as to endanger the breaking of the tube. Thus the first measure is marked; and in like manner may any other one be marked. The attentive practitioner, however, should never venture to mark the tube with an indelible stroke after one trial, lest

No 121.

he should be mistaken. The proper method is to mark them first with wax, and then repeat the operation once or twice, in order to correct some errors that might escape the first time; after which the mark may be made with a diamond, flint, or perhaps more conveniently with a file. The polish of the inside of both tube and measure should be taken off with emery; which is a very laborious operation, though it is particularly necessary that the measure should be done in this manner.”

To use this eudiometer, fill the tube with water, taking care that no bubbles of air remain in it; and inverting it with the mouth downwards, leave it in the water leaning against the side of the tub. Fill the measure then with the elastic fluid whose purity is to be tried. Put the eudiometer tube upon the shelf of the tub, keeping it perpendicular, and with the mouth exactly upon the hole of the shelf, and throw the measure of air into it; fill it again with the same air, and throw this likewise into the tube. Then fill it with nitrous air, and throw this also into the tube, which must be shaken immediately after the operation by moving it alternately up and down in the water of the tub for about a quarter of a minute. It is then left a short time at rest and suspended by the hook formerly mentioned, so that the surface of the water in the inside may be about two inches above that in the tub; when the brass scale is slid upon it till the upper edge of the lower ring coincide with the middle part of the surface of the water within the tube, and then we may observe which division of the scale coincides with any of those on the tube; by which means the quantity of elastic fluid remaining in the tube may be clearly seen, even to the hundredth-part of a measure. The following directions are given by our author for noting down the results in a clear and accurate manner.

1. The two measures first introduced into the tube are expressed by a Roman number; after which the noting down the results of the experiments. single measure of nitrous air is expressed by another Roman number; and the measures, with the parts of a measure remaining in the tube after diminution, are expressed by common numbers with decimals.—Thus, suppose, that after introducing two measures of common and one of nitrous air, and after shaking in the manner above directed, the quantity of fluid remaining in the eudiometer is such, that when the upper edge of the lower ring of the scale coincides with the lower point of the surface of the water in the tube, the 56th division of the scale falls against the second circular division on the tube, then this diminution is marked thus II, I, 2,56; signifying that two measures of common and one of nitrous air, after diminution by being mixed together, occupy the space of two measures and 56 hundredth-parts of a measure.—Lastly, after marking the first diminution, throw a second measure of nitrous air into the tube; shake the instrument; and after a little rest, observe this second diminution: which, supposing it to have reduced the whole bulk to three measures and seven hundredth-parts, is thus marked down, II, II, 3,07. Sometimes one, two, or three measures of nitrous air must still be added, in order to observe the diminution of some very pure species of respirable air. The divisions which begin from the upper ring of the scale-piece of the eudiometer are useful when the quantity of elastic fluid

Eudiometer.

18
Method of using it.

19
Method of noting down the results of the experiments.

Eudiometer.

Eudiometer.

contained in it is so small, that the edge of the lower brass ring cannot be raised so high as to coincide with the edge of the water within the tube on account of the silk loop: in which case the under edge of the upper ring is brought to that point; and we must then observe which of those divisions coincides with the first circular division upon the tube. If it be asked, Why the two or more measures of nitrous air are not thrown into the tube all at once, and the last diminution noted? the answer is, That in this method, the effects of similar experiments have not been found equally uniform with those tried in the above mentioned manner.

20
Precautions
necessary
to be observed
in making the
experiments.

2. "In this operation care should be taken to shake the tube immediately after the nitrous air has been thrown into it, and to leave it at rest afterwards for some time; otherwise the results of similar experiments are far from being alike. It is also necessary to observe, that by holding the measure or the eudiometer tube with the hand, which is warmer than the water of the tub, the elastic fluid undergoes some degree of rarefaction, so that the event of the experiments may often be rendered precarious. For this reason the instruments should be held only with the extremities of the fingers and thumb; and before the door of the measure be shut, or the point of the scale on the eudiometer tube be fixed, those instruments should be left a short time by themselves, keeping the hands and breath at a sufficient distance from them."

21
Phenomena
to be observed
in experiments
of this kind.

The following are some particulars necessary to be observed in making experiments of this kind.

1. When respirable air is mixed with nitrous air, their joint bulk is diminished, and the diminution is greater when the air is purer, *ceteris paribus*, and *vice versa*.

2. On mixing the two airs together all at once, the ensuing diminution is greater than if the same quantity of nitrous air be added to an equal quantity of respirable air at different times: and hence it follows, that the quicker the two sorts of elastic fluids are mixed together, the greater is the diminution, and contrarywise.

3. Nitrous air of different quality occasions a different degree of diminution with respirable air; and therefore care should be taken to use such materials as afford air always of the same quality. The most proper substance for this purpose is very pure quicksilver; a quarter of an ounce, or even less, with a proper quantity of diluted nitrous acid, will produce a great deal of nitrous air, which is always of the same quality, provided the metal be always of equal purity; but with other metals, as brass, copper, &c. the nitrous air made at one time is often different from that made at another, and therefore occasions a greater or less diminution when mixed with common air though precisely of the same sort.

4. The quality of nitrous air is impaired by keeping, especially when in contact with water; and for this reason it ought to be prepared fresh every two or three days.

5. In performing these experiments, it should be carefully remarked, that no mistake arise from heat or cold; as the elastic fluids are easily contracted or expanded by any variation of temperature.

6. Though the greatest diminution takes place immediately after mixing the respirable and nitrous airs together, especially when they are agitated, yet they continue to diminish a little for some time after; for which reason the diminution should be observed always at a certain time after the mixture is made. The whole process indeed ought always to be performed in an uniform manner, otherwise the results will be frequently very dissimilar.

7. It must be remarked, that the surface of the water which lies contiguous to the elastic fluid contained in a small vessel, is very far from being a plane, or even from being always of a similar figure in the same vessel, on account of the attraction or repulsion between the substance of the glass and water. This is altered by many circumstances, particularly by the adhesion of extraneous bodies; whence it is very improper to use common open phials for this purpose. We must also take into consideration the drops of water adhering to the sides of the vessel, and the quality of the water in which the operation is performed.

8. In case the experiment is to take up some hours, in order to observe the last diminution, it will be proper to notice, by a good barometer, if the gravity of the atmosphere has suffered any alteration during that time; for a difference in its pressure may occasion some difference in the result of the experiments.

9. A simple apparatus is always to be preferred to a more complicated one, even though the latter should appear to have some advantage over it in point of accuracy. Complex machines are not only expensive, and subject to be easily put out of order, but occasion frequent mistakes, on account of the operator having generally many things to do and keep in proper order; whence it is easy to overlook some of them.

It has already been remarked, that one source of error in the experiments made with eudiometers is the inequality of the column of water in the tube by which the mixture of elastic fluids is confined. For example, if a cubic inch of air, taken near the apparatus where the experiment is to be performed, be introduced into a long tube previously filled and inverted in water, so that the surface of the water in the tube may be 20 inches higher than that in the basin, the air in the upper part will then be found to occupy a considerably larger space than if the column of water was shorter; because in the former case the pressure of the water in the tube partly counterbalances the pressure of the atmosphere, so that the latter is less able to resist the elasticity of the confined air. The difference will be much greater if quicksilver be made use of instead of water, as the weight of that fluid is much greater than that of water. To avoid this, it has been directed to manage matters so that the surface of the fluid on the outside may nearly correspond with that in the inside of the tube; but this is sometimes impracticable, especially where quicksilver is used, with which the error is more considerable than with water: in such cases, therefore, we must have recourse to calculation, and deduce the real quantity of elastic fluid from the apparent space it occupies in a receiver, which is partly filled with it and partly with water or some other gross fluid. For this purpose it must be remembered, that the spaces into which air or any other elastic fluid is contracted, are to one another in the inverse ratio of the pressures which confine these elastic fluids: hence the space occupied by a quantity of elastic fluid *AB*, (fig. 9.)

22
Of the
sources of
error in
this kind
of experiments.

D

confined

Eudiometer

confined in the tube *AC* inverted in quicksilver, and filled with it as far as *B*, is to the space which the same quantity of fluid occupies out of the tube, as the pressure which acts upon it when out of the tube is to the pressure which acts upon it in the tube; that is, as the height of the barometer, to the same height of the barometer deducting the height *BC* of the quicksilver in the tube. Thus, suppose that the length *AB* of the tube occupied by an elastic fluid is three inches, and that the length *BC*, filled with quicksilver, is 20 inches; it is required to determine the length of the same tube, which the same quantity of elastic fluid would occupy if the surface of the quicksilver in the basin was brought even with *B*, viz. if the said elastic fluid was only acted upon by the pressure of the atmosphere. First observe the height of the barometer at that time, which suppose to be 30 inches; then say, As the height of the barometer is to the same height deducting the height of the quicksilver *CB* in the inverted tube *AB*; so is the space *AB* to the real

space required; that is, $30 : 30 - 20 :: 3 : \frac{3 \times 30 - 20}{30}$

= 1 : so that one inch is the length of the tube *AC* which the quantity of elastic fluid *AB* would occupy, if the surface *B* of the quicksilver in it was brought even with that of the quicksilver in the basin. Here, however, we must suppose the tube *AC* to be perfectly cylindrical; otherwise the calculation would become very intricate by being adapted to the form of the vessel.

²³
Mr Cavendish's eudiometer.

VIII. In the 73d volume of the Philosophical Transactions, we have an account of a new eudiometer by Mr Cavendish. He prefers the Abbe Fontana's to all the rest: the great improvement in which (he says) is, that as the tube is long and narrow, and the orifice of the funnel not much less than the bore of the tube, and the measure made to deliver its contents very quick, the air rises slowly up the tube in one continued column; so that there is time to take the tube off the funnel, and to shake it before the airs come quite into contact; by which means the diminution is much greater and more certain than it would otherwise be. Thus, if equal measures of nitrous and common air are mixed together in this manner, the bulk of the mixture will, in general, be about one measure; but if the airs are suffered to remain in contact about a quarter of a minute before they are shaken, the bulk will hardly be less than one measure and one fifth; and it will be very different according to the length of time they are suffered to remain before they are shaken. In like manner, if, through any fault in the apparatus, the air rises in bubbles, as in that case it is impossible to shake the tube soon enough, the diminution is always less than it ought to be. Another very considerable advantage arising from the method of mixing the airs just mentioned is, that the diminution takes place in its full extent almost instantly; but if they are allowed to remain for some time in contact before they are shaken, the mixture will continue diminishing for many hours afterwards.

²⁴
Why Fontana's method excels the rest so much.

The reason of these differences, according to our author, is, that, in the Abbe Fontana's method, the water is shaken briskly up and down in the tube while the airs are mixing; by which means every small portion of nitrous air must be in contact with water ei-

ther at the instant it mixes with the common air, or at least immediately after; and it seems that the water, by absorbing the nitrous acid the moment it is formed, greatly contributes to the quickness of the diminution, as well as to the quantity of it. Hence Mr Cavendish was induced to try whether the diminution would not be more certain and regular, if one of the airs were added to the other slowly and in small bubbles, the vessel being kept shaking all the while that the mixture was made: and on trial he found that this method fully answered his expectations.

The apparatus used by our author is, 1. A cylindrical glass vessel *A* (fig. 10.), with brass caps at top and bottom. To the upper cap a brass cock *B* is fitted: the bottom cap is open, but made to fit close into the brass socket *Dd*, and is fixed into it in the same manner as a bayonet is on a musket. This socket has a small hole *E* in its bottom, and is fastened to the board of the tub by the bent brass *FfG*, in such a manner that *b*, the top of the cock, may be about half an inch under water: consequently, if the vessel *A* is placed in its socket with any quantity of air in it, and the cock is then opened, the air will run out by the cock; but will do so very slowly, as it can escape no faster than the water can enter by the small hole *E* to supply its place.

2. Besides this vessel, there are three glass bottles like *M*, fig. 11. having each a flat brass cap at bottom to make it stand steady, and a ring at top to suspend it; also some glass measures of different sizes, as *B* fig. 12. having a flat brass cap at bottom with a wooden handle. These are filled with the air to be measured, then set upon the brass knob *C* fitted to the board of the tub below the surface of the water, which drives out some of the air, leaving only the proper quantity.

In mixing the airs together, our author commonly adds the respirable slowly to the nitrous; to do which, a proper quantity of nitrous gas is put into the bottle *M*, by means of one of the measures already described, and another quantity of respirable air is put into the vessel *A*, by first filling it with this air, and then putting it on the knob *C*, as was done by the measure; after which the vessel *A* is fixed in the socket, and the bottle *M* placed with its mouth over the cock. The quantities of air made use of, and the diminution of the mixture, are determined by weighing the vessels under water in the following manner. From one end of a balance, placed in such a manner as to hang over the tub of water, a forked wire is suspended, to each end of which fork is fixed a fine copper wire; and in trying the experiment, the vessel *A*, with the respirable air in it, is first weighed by suspending it from one of those copper wires, so that it may remain entirely under water. The bottle *M*, with the proper quantity of nitrous air in it, is then hung in the same manner on the other wire, and the weight of both together determined. The air is then let out of the vessel *A* into the bottle *M*, and the weight of both vessels together found a second time; by which we know the diminution of bulk the airs suffer on being mixed. Lastly, the bottle *M* is taken off, and the vessel *A* weighed again by itself, which gives the quantity of respirable air made use of. It is needless to determine the quantity of nitrous air by weight; because, as the

Eudiometer

²⁵
Advantage of adding one of the airs slowly to the others.

²⁶
Mr Cavendish's apparatus described.

²⁷
His method of mixing the airs, &c.

Fig. 10, 11.

Eudiometer

Eudiometer.

quantity used is always sufficient to produce a full diminution, a small difference therein makes no sensible one in the diminution. No sensible error can arise from any difference in the specific gravity of the air; for the thing found by weighing the vessel is the difference of weight of the included air and an equal bulk of water; which, as air is no less than 800 times lighter than water, is very nearly equal to the weight of a quantity of water equal in bulk to the included air. A common balance is not convenient for weighing the bottles under water, without some addition to it: for the lower the vessel of air sinks under water, the more the air is compressed; which makes the vessel heavier, and thereby causes that end of the beam to preponderate. Hence we must either have the index placed below the beam, as in many essay-balances; or by some other means remove the centre of gravity of the beam so much below the centre of suspension, as to make the balance vibrate, notwithstanding the tendency which the compressibility of the air in the vessels has to prevent it.

In this manner of determining the quantities of the air by weight, care must be taken to proportion the lengths of the copper wires in such a manner that the surface of the water in *A* and *M* shall be on the same level, when both have the usual quantity of air in them; as otherwise some errors will arise from the air being more compressed in one than the other. This precaution, indeed, does not entirely take away the error, as the level of the water in *M* is not the same after the airs are mixed that it was before; but in vessels of the size used by our author, this error could never be equal to the 500th part of the whole; which therefore is quite inconsiderable: but even if it was much greater, it could be of no consequence, as it would always be the same in trying the same kind of air.

The vessel *A* (fig. 10.), used in these experiments, holds 282 grains of water, and is the quantity denominated *one measure* by our author. There are three bottles for making the mixture, with a measure *B* (fig. 12.) for the nitrous air adapted to each. The first of these holds three measures, and the corresponding measure one and one-fourth of the former measure; the second bottle holds six, and the corresponding measure $2\frac{1}{2}$; the third holds 12, and the corresponding measure five. The first bottle and measure are made use of in trying common air, and the others for the dephlogisticated or purer kinds. As the same quantity of respirable air is always made use of, $1\frac{1}{4}$ measure of nitrous air is added to one of the common atmospherical kind; and in trying very pure dephlogisticated air, five measures of the nitrous kind are made use of; and our author is of opinion, that there is no kind of air so pure as to require a greater quantity of nitrous air. The way by which it is known whether a sufficient quantity of nitrous air has been added, is to observe the bulk of the mixture; for if that is not less than one measure, that is, than the respirable air alone, it is a sign that the quantity of nitrous air is sufficient, or that it will produce the proper diminution, unless it be very impure. It must be observed, however, that though the quantity of respirable air will always be nearly the same, as being put in by measure, yet the observed diminution will commonly require some correction. For example, suppose that the observed diminution was 2.353 measures, and that the

quantity of respirable air was found to be .985 of a measure; then the observed diminution must be increased by .035, in order to have the true diminution, or that which would have been produced if the respirable air made use of had been exactly one measure; whence the true diminution is 2.388.

In weighing common air, our author somewhat abridges the process above described. He does not weigh the vessel *A*, but only the bottle *M* with the nitrous air in it; then mixes the airs, and again weighs the same bottle with the mixture in it, and finds the increase of weight; which added to one measure, is very nearly the true diminution whether the quantity of common air made use of was a little more or a little less than one measure. The reason of this is, that as the diminution produced by the mixture of common and nitrous air is only a little greater than the bulk of the common air, the bulk of the mixture will be very nearly the same whether the bulk of the common air be a little greater or a little less than one measure. Let us suppose, for example, that the quantity of common air made use of is exactly one measure, and that the diminution of bulk on mixing is 1.08 of a measure; then must the increase of the weight of the bottle *M*, on adding the common air, be .08 of a measure. Let us next suppose that the quantity of common air made use of is 1.02 of a measure; then will the diminution,

on adding the nitrous air, be $1.08 + \frac{1.02}{1.00}$ or 1.1016 of a measure; and consequently the increase of the weight of the bottle *M* will be $1.1016 - 1.02$, or .0816 of a measure, almost exactly the same as if precisely one measure of common air had been made use of.

The same bottle is made use of, viz. that which holds three measures, when the nitrous is added to the respirable air. In this experiment the bottle *M* is first weighed without any air in it, and then weighed again when full of respirable air, which gives the quantity of the latter made use of. The nitrous air is then put into the vessel *A*, and weighed together with the bottle *M*; after which, having mixed them together, the diminution takes place, and they are weighed again, in order to discover its quantity. In this method a smaller quantity of nitrous air is necessary than in the former. In the first method, it was found that the diminution was scarce sensibly less when one measure of nitrous air was used than with a much larger quantity; so that one measure may be accounted fully sufficient. Our author, however, chose to employ $1\frac{1}{4}$ measure, lest the nitrous air should be impure. There was no sensible diminution whether the orifice of the vessel *A* opening into the bottle *M* was $\frac{1}{16}$ th or $\frac{1}{8}$ th of an inch; that is, whether the air escaped in small or large bubbles: the diminution was rather greater when the bottle was shaken briskly than otherwise; but all the difference that could be perceived between these two methods of shaking did not exceed .01 of a measure. The diminution, however, was remarkably less when the bottle was not shaken at all; being at first only 0.9; in about three minutes it increased to 0.93; and after being shaken for about a minute, it increased to 0.99; but when gently shaken at first, the diminution was 1.08 on mixing, and did not sensibly increase after that time. Some difference was found to arise from the length of time the air took up in passing from one vessel

28
Of adding
the nitrous
to the re-
spirable.

Eudiometer.

29
Variations arising from the size of the bottles and quality of the water.

30
Attempt to remedy the inconveniences from the different quality of the water.

to another. When it took up 80 seconds, for instance, in passing from the one bottle into the other, there was a difference of 5 hundredth-parts more than when it took up only 22 seconds, and about 2 hundredth-parts more than when it took up 45 seconds; but at other times the difference was less. As the hole in the plate *Dd*, however, was always the same in our author's experiments, the time taken up by the air in passing from one vessel into the other varied so little that no perceptible difference could arise from that cause. A greater difference arose from the size of the bottles and quality of the water made use of. When the small bottle, holding three measures, was used, and filled with distilled water, the diminution of common air was usually 1.08; but when the bottle was filled with water from the tub, it was .05 less. Using the bottle which held 12 measures, and filled with distilled water, the diminution was about 1.15; and with the same bottle filled with water from the tub it was usually 1.08. "The reason of this (says Mr Cavendish) is, that water has the power of absorbing a small quantity of nitrous air; and the more dephlogisticated the water is, the more of this air it can absorb. If the water is of such a nature also as to froth or form bubbles on letting in the common air, the diminution is remarkably less than in other water. In general the diminution was nearly as great with rain as with distilled water; but sometimes the former would froth a good deal: in which case it was no better than water fouled with oak-shavings. This difference of diminution, according to the nature of the water, is a very great inconvenience, and seems to be the chief cause of uncertainty in trying the purity of the air; but it is by no means peculiar to this method, being equally great in that of Fontana's. In his method indeed it makes little difference whether the water be disposed to froth or not; but this is no great advantage, as it is easy to find water which will not froth; though it shows plainly how little any of the experiments hitherto made on the purity of air can be depended upon." The best method of obviating this inconvenience is to be always careful to use the same kind of water: our author always made use of distilled water; but found that even this was sometimes endowed with a greater power of absorbing nitrous air than at others: and with a view to remedy this, he made the following experiment. Some distilled water being purged of its air by boiling, one part was kept for a week in a bottle with dephlogisticated air, and frequently shaken; the other part being treated in the same manner with phlogisticated air. By a mean of three different trials the test of common air tried with the first of these waters was 1.139; the diminution suffered by shaking nitrous air in it for two seconds being about 0.285. The test of the same air tried with the other water was 1.054, and the diminution by nitrous air only 0.09; the heat of the water in the tub and of the distilled waters being 45°. The heat of the water in the tub and the distilled waters was then raised to 67°; when the test of the same air tried by the first water was 1.100, and by the latter 1.044; the diminution of nitrous air with the first water being 0.235; by the latter 0.089. Hence it might seem that the observed test ought to be corrected by the subtraction of $\frac{1}{10}$ ths of the diminution which nitrous air suffers by being shaken in the water, and adding 002 for every three degrees of heat above 0;

but though this correction will undoubtedly diminish the error, he is of opinion that it will not by any means take it away entirely; and from some circumstances it appears that distilled water possesses a property of absorbing different quantities of nitrous air independent of its heat.

In the second method, viz. when the nitrous acid is added to the common air, the diminution is considerably less than in the other; the reason of which is, that when nitrous and common air are mixed together, the former is deprived of part of its phlogiston, and is thereby converted into phlogisticated nitrous acid, and in that state is absorbed by the water; besides that the common air is phlogisticated, and thereby diminished: so that the whole diminution on mixing is equal to the bulk of nitrous air which is turned into acid, added to the diminution which the common air suffers by being phlogisticated. Now it appears, that when a small quantity of nitrous air comes in contact with a large one of common air, the former is more completely deprived of its phlogiston, and absorbed by the water in a more dephlogisticated state than when a small quantity of common air comes into contact with a large quantity of nitrous: in the second method, therefore, where small portions of nitrous air come in contact with a large quantity of common air, the former, as has been just observed, is more deprived of its phlogiston; and therefore a smaller quantity of it is required to phlogisticate the common air than in the former method, where small portions of common air come in contact with a large quantity of nitrous air; so that a less quantity of the nitrous air is absorbed in the second method than in the first. The common air most probably suffers an equal diminution in both cases.

Another proof that a smaller quantity of nitrous air is required in this method than the former is, that if common air be mixed with a quantity of nitrous air not sufficient to phlogisticate it, the mixture will be more phlogisticated if the nitrous be added slowly to the common air without being in contact with water; the mixture will be found to be still more phlogisticated than in the second method where the two airs are in contact with water at the time of mixing. The final result of Mr Cavendish's experiments on this subject is, that nitrous air used in the first method does not phlogisticate common air more than three-fourths of the same quantity used in the second way; and not so much as one half of the quantity used in the third way, viz. by adding the nitrous air slowly to the other, without being in contact with water.

With respect to the quality of nitrous air used in these experiments, our author observes that it may vary in two respects. 1. In purity; that is, in being more or less mixed with phlogisticated or other air. 2. In two parcels of equally pure air, it is possible that one parcel may contain more phlogiston than the other. A difference in the second respect will cause an error in the test, in whatever proportion it be mixed with the respirable air; but if it differs in the first respect, it will scarcely cause any error unless it be uncommonly impure; provided care is taken to use a quantity sufficient to make a full diminution. It must be observed, however, that if the nitrous air be mixed with fixed air, an error will be occasioned, because part of the latter is absorbed while the test is trying; but this will hardly be

Eudiometer.

31
Why the diminution is less when the nitrous is added to the respirable air.

32
Conclusions from Mr Cavendish's experiments.

33
Of the different properties of nitrous air.

Eudiometer.
Eudofia

be the case, unless either the metal from which it is procured be covered with rust, or unless the water in which it is received contain much calcareous earth suspended by fixed air; as in that case, if any of the nitrous acid comes over with the air, it will dissolve the calcareous earth, and separate some fixed air.

To determine whether it be possible for nitrous air to differ in the second respect, our author procured some from quicksilver, copper, brass, and iron: in making experiments with which, he found that the difference between the tests tried with the three first kinds of air was not greater than what might proceed from the error of the experiment; but those with the air from iron .015 greater than the rest. From other experiments it appeared that the nitrous air from iron was not only more impure than that from other metals, but that the pure portion it contained had less phlogiston in it than that from copper or quicksilver. He is of opinion, however, that copper affords nitrous air sufficiently pure for experiments of this kind without having recourse to quicksilver, as Mr Cavallo advises.

In some of his experiments, Mr Cavendish had occasion to use a larger apparatus, which is represented fig. 13. *A* represents a bottle containing nitrous air inverted into the tub of water *DE*. *B* is a bottle fitted with a bent glass tube *C*. This bottle is to be filled with common air without any water, and is first slightly warmed by the hand: the end of the glass tube is then put into the bottle of nitrous air as represented in the figure. As the bottle *B* cools, a little nitrous air runs into it, which instantly loses its elasticity in consequence of coming into contact with the atmospherical air. This condensation occasions an influx of fresh nitrous air, and so on till the whole is exhausted. By this means the nitrous air is added slowly to the other without coming into contact with water, till the whole of it has run out from the bottle *A* into *B*; after which the water flows in to supply the vacancy occasioned by the diminution.

EUDOSIA, (ATHENIA, before her conversion to Christianity), a celebrated lady, the daughter of Leontius, philosopher of Athens; who gave her such a learned education, that at his death, he left her only a small legacy, saying she was capable to make her own fortune: but pleading at Athens without success against her two brothers, for a share in her father's estate, she carried her cause personally by appeal to Constantinople; recommended herself to Pulcheria, the sister of the emperor Theodosius the younger; embraced Christianity, was baptized by the name of *Eudofia*, and soon after married to the emperor. Their union lasted a considerable time: but a difference at last taking place, on account of the emperor's jealousy excited by Chrysapius the eunuch, she retired to Jerusalem, where she spent many years in building and adorning churches and in relieving the poor. Dupin says, that she did not return thence till after the emperor's death: but Cave tells us, that she was reconciled to him, returned to Constantinople, and continued with him till his death; after which she went again to Palestine, where she spent the remainder of her life in pious works. She died in the year 460, according to Dupin; or 459, according to Cave: the latter observes, that on her death-bed she took a solemn oath, by which she declared herself entirely free from any stains of un-

chastity. She was the author of a paraphrase on the eight first books of the Old Testament in heroic verse; and of a great number of poems, which are lost.

EUDOXIANS, a party or sect of heretics in the fourth century, so denominated from their leader Eudoxius, patriarch of Antioch and Constantinople, a great defender of the Arian doctrine. The Eudoxians adhered to the errors of the Arians and Eunomians, maintaining, that the Son was created out of nothing; that he had a will distinct and different from that of the Father, &c.

EVE. See VIGIL.

EVE, the mother of all mankind; who being deluded by the serpent, occasioned the fall, and all its dismal consequences. See ADAM.

EVELYN (John), a most learned and ingenious writer and natural philosopher, was born at Wotton in Surry, the seat of his father, in 1620. After making the tour of Europe, he returned to England about the year 1651, and lived very retired at his rural retreat, Say's Court, near Deptford in Kent; where his disgust at the violence and confusion of the times operated so far upon his studious disposition, that he actually proposed to Mr Boyle the establishing a kind of college for persons of the same turn of mind, where they might associate together without care or interruption. It was owing to Mr Evelyn's gratitude to the place of his education, that Oxford became possessed of the famous Arundelian marbles; which he persuaded the Lord Henry Howard to bestow on that university. He was very assiduous in transmitting to the royal society whatever fell within the compass of his inquiries, and used humbly to style himself *a pioneer in the service*. When the number of books he published is considered, the many he left behind him unfinished and unpublished, and the variety of subjects on which he employed his time, his industry and application are astonishing. "His life (says the honourable Mr Walpole) was a course of inquiry, study, curiosity, instruction, and benevolence. The works of the Creator, and the mimic labours of the creature, were all objects of his pursuit. He unfolded the perfections of the one, and assailed the imperfections of the other. He adored from examination; was a courtier that flattered only by informing his prince, and by pointing out what was worthy for him to countenance; and was really the neighbour of the Gospel, for there was no man that might not have been the better for him. He was one of the first promoters of the royal society, a patron of the ingenious and indigent, and peculiarly serviceable to the lettered world; for, besides his writings and discoveries, he obtained the Arundelian marbles for the university of Oxford, and the Arundelian library for the royal society: nor is it the least part of his praise, that he who proposed to Mr Boyle the erection of a philosophic college for retired and speculative persons, had the honesty to write in defence of active life against Sir George Mackenzie's Essay on Solitude. He knew that retirement in his own hands was industry and benefit to mankind; but in those of others, laziness and inutility." There are five small prints of this gentleman's journey from Rome to Naples, drawn and etched by him; and among his published works are, 1. A Character of England; 2. The State of France; 3. An Essay on the first book of Lucretius *De rerum natura*; 4. The French.

Eudoxians
||
Evelyn.

Evergetus
||
Eugene

French gardener; 5. A Panegyric on King Charles II's coronation; 6. *Fumifugum*, or the inconveniences of the air and smoke of London dissipated; 7. The History and Art of Engraving on Copper; 8. A parallel between the ancient architecture and the modern; 9. *Sylva*, or a discourse of forest-trees; and several others. This amiable gentleman died, full of age and honour, in 1706. His son John Evelyn, born in 1654, distinguished himself by his elegant translations and poems: He was one of the commissioners of the revenue in Ireland; but died early in life, in 1698.

EVERGETES, a surname signifying *benefactor*, given to Philip of Macedonia, and to Antigonus Doson, and Ptolemy of Egypt. It was also commonly given to the kings of Syria and Pontus, and we often see among the former an Alexander Evergetes, and among the latter a Mithridates Evergetes. Some of the Roman emperors also claimed that epithet of Benevolent and Humane.

EVERGREEN, in gardening, a species of perennials, which continue their verdure, leaves, &c. all the year: such are hollies, phillyreas, lauristinuses, bays, pines, firs, cedars of Lebanon, &c.

EVERLASTING PEA. See LYTHYRUS.

EVES-DROPPERS. See *EAVES-Droppers*.

EVESHAM, or EVESHOLM, commonly called *E-sam*, a town of Worcestershire, seated on a gentle ascent from the river Avon, over which there is a bridge of seven arches. It is 95 miles from London, 14 miles from Worcester, and has a harbour for barges. It is an old borough, reckoned the second in the county; and sends two members to parliament. It had formerly an abbey with a mitred abbot; which abbey when standing was one of the largest and most stately of any in the kingdom. It was governed by a bailiff, till king James I. at the request of his son Prince Henry, gave it a charter for a mayor, 7 aldermen, 12 capital burgeses, a recorder, and chamberlain, who are all of the common council, with 24 other burgeses called assistants. Four of the aldermen, and the mayor for the time being, are justices of the peace; and of oyer and terminer, and of gaol delivery, for all offences in the corporation, except high treason; and the corporation has power to try and execute felons within the borough. Here are two parish-churches; but the bells of both have been removed to a beautiful old tower which was one of the gates of the abbey. This town is noted for the great victory obtained near it by Prince Edward, afterwards King Edward I. over Simon Montfort, the great earl of Leicester, who was killed in the battle. There is an open prospect from hence of the spacious valley called the *vale of Evesham* or *vale of Gloucester*, which so abounds with the best of corn, as well as pasture for sheep, that it is reckoned the granary of all these parts. The vale runs all along the banks of the Avon, from Tewkesbury to Pershore, and to Stratford in Warwickshire, and the river is so far navigable. It has a weekly market and four fairs. The market-house built by Sir Edward Hobby has its upper apartments used by the corporation for a sessions-house, and formerly for the assizes of the county. There are considerable garden-grounds around the place, the produce of which supplies the adjacent towns.

EUGENE (Francis), prince of Savoy, descended from Carignan, one of the three branches of the house

of Savoy, and son of Eugene Maurice, general of the Swiss and Grisons, governor of Champagne, and earl of Soissons, was born in 1663. Louis XIV. to whom he became afterwards so formidable an enemy, thought him so unpromising a youth, that he refused him preferment both in the church and the state, thinking him too much addicted to pleasure to be useful in either. Prince Eugene, in disgust, quitted France; and, retiring to Vienna, devoted himself to the imperial service. The war between the emperor and the Turks afforded the first opportunity of exerting his military talents; and every campaign proved a new step in his advancement to the highest offices in the army. He gave the Turks a memorable defeat at Zenta; commanded the German forces in Italy, where he foiled marshal Villeroy in every engagement, and at length took him prisoner. Our limits do not allow a detail of his campaigns; but prince Eugene distinguished himself greatly, when the emperor and queen Anne united against the exorbitant power of Louis XIV. He died at Vienna in the year 1736; and was as remarkable for his modesty and liberality, as for his abilities in the field and the cabinet.

EUGENIA, the YAMBOO: A genus of the monogynia order, belonging to the icosandria class of plants; and in the natural method ranking under the 19th order, *Hesperideæ*. The calyx is quadripartite, superior; the petals four; the fruit a monospermous quadrangular plum. There are two species, both natives of the hot parts of Asia. They rise from 20 to 30 feet high; and bear plum-shaped fruit, inclosing one nut. They are too tender to live in this country, unless they are constantly kept in a stove.

EVICTION, in law, signifies a recovery of lands or tenements by law.

EVIDENCE, that perception of truth which arises either from the testimony of the senses or from an induction of reason.

EVIDENCE, in law, signifies some *proof* by testimony of men upon oath, or by writings or records. It is called *evidence*, because thereby the point in issue in a cause to be tried is to be made *evident* to the jury; for *probationes debent esse evidentes et perspicuae*. The system of evidence, as now established in our courts of common law, is very full, comprehensive, and refined; far different from, and superior to, any thing known in the middle ages;—as far superior in that as in all other improvements and refinements in science, arts, and manners.

The nature of evidence during the ages of ignorance was extremely imperfect, and the people were incapable of making any rational improvement. Thus it was the imperfection of human reason that caused the invention and introduction of the ORDEAL, as an appeal to the Supreme Being. As men are unable to comprehend the manner in which the Deity carries on the government of the universe, by equal, fixed, and general laws, they are apt to imagine, that in every case which their passions or interest render important in their own eyes, the Supreme Ruler of all ought visibly to display his power in vindicating innocence, and punishing vice.

EVIL, in philosophy, &c. is either moral or natural. Moral evil is the disagreement between the actions of a moral agent, and the rule of those actions what

Eugenia
||
Evil.

Evil whatever it is*.—Natural evil is, whatever destroys or any way disturbs the perfection of natural beings: such as blindness, diseases, death, &c.

Euler. *King's Evil, or Scrophula.* See MEDICINE-Index.
 • See Mor. & Philosophy. *Evil-Merodach*, the son and successor of Nebuchadnezzar the Great, king of Babylon, succeeded to the crown in the year of the world 3443; but governed the kingdom during the indisposition of his father, who after seven years, having recovered his understanding, once more ascended the throne; and, as some believe, imprisoned his son Evil-Merodach. In this confinement it is supposed that Evil-Merodach made an acquaintance and friendship with Jehoiachim king of Judah, who had been carried to Babylon by Nebuchadnezzar. However that was, it is certain, that, soon after his succession to the throne, he delivered the king of Judah out of prison, after a confinement of 37 years, heaped many favours on him, and placed him above all the other kings who were at the court of Babylon, (2 Kings xxv. 27. Jer. lii. 31.) Evil-Merodach reigned but one year, according to the chronology of Archbishop Usher; but Dr Prideaux will have him to have reigned two years, and was succeeded by Neriglissar his sister's husband, who having been at the head of a conspiracy that put him to death, reigned in his stead. Others will have it, that this prince was immediately succeeded by his son BEL-SHAZZAR.

EULER (LEONARD), professor of mathematics, member of the imperial academy of Peterburgh, ancient director of the royal academy of Berlin, and fellow of the royal society of London, as also correspondent member of the royal academy of sciences at Paris, was born at Basil, April 15th, 1707, of reputable parents. The years of his infancy were passed in a rural retreat at the village of Riehen, of which place his father was minister.—Being sent to the university of Basil, he attended regularly the different professors. As his memory was prodigious, he performed his academical tasks with uncommon rapidity; and all the time he gained by this was consecrated to geometry, which soon became his favourite study. The early progress he made in this science, only added new ardour to his application; and thus he obtained a distinguished place in the attention and esteem of professor John Bernouilli, who was at that time one of the first mathematicians in Europe. In 1723, M. Euler took his degree as master of arts; and delivered on that occasion a Latin discourse, in which he drew a comparison between the philosophy of Newton and the Cartesian system; which was received with the greatest applause. He afterwards, at his father's desire, applied himself to the study of theology and the oriental languages. Though these studies were foreign to his predominant propensity, his success was considerable even in this line: however, with his father's consent, he returned to geometry as his principal object. He continued to avail himself of the counsels and instructions of M. Bernouilli; he contracted an intimate friendship with his two sons Nicholas and Daniel; and it was in consequence of these connections that he became afterwards the principal ornament of the academy of Peterburgh. The project of erecting this academy, which had been formed by Peter the Great, was executed by Catharine I.; and the two young Bernouillis being in-

vited to Petersburg in 1725, promised Euler, who was desirous of following them, that they would use their utmost endeavours to procure for him an advantageous settlement in that city. In the mean time, by their advice, he applied himself with ardour to the study of physiology, to which he made a happy application of his mathematical knowledge; and he attended the medical lectures of the most eminent professors of Basil. This study, however, did not wholly engross his time: it did not even relax the activity of his vast and comprehensive mind in the cultivation of other branches of natural science. For while he was keenly engaged in physiological researches, he composed A Dissertation on the Nature and Propagation of Sound, and an answer to a prize question concerning the masting of ships; to which the academy of sciences adjudged the *accessit*, or second rank, in the year 1727. From this latter discourse, and other circumstances, it appears that Euler had early embarked in the curious and important study of navigation, which he afterwards enriched with so many valuable discoveries.

M. Euler's merit would have given him an easy admission to honourable preferment, either in the magistracy or university of his native city, if both civil and academical honours had not been there distributed by lot. The lot being against him in a certain promotion, he left his country, set out for Peterburgh, and was made joint professor with his countrymen Messrs Hermann and Daniel Bernouilli in the university of that city. At his first setting out in his new career, he enriched the academical collection with many memoirs, which excited a noble emulation between him and the Bernouillis; and this emulation always continued, without either degenerating into a selfish jealousy, or producing the least alteration in their friendship. It was at this time that he carried to new degrees of perfection the integral calculus, invented the calculation of sinuses, reduced analytical operations to a greater simplicity, and thus was enabled to throw new light on all the parts of mathematical science. In 1730, he was promoted to the professorship of natural philosophy; and in 1733 he succeeded his friend D. Bernouilli in the mathematical chair. In 1735, a problem was proposed by the academy which required expedition, and for the solution of which several eminent mathematicians had demanded the space of some months. The problem was solved by Euler in three days, to the great astonishment of the academy; but the violent and laborious efforts it cost him threw him into a fever, which endangered his life, and deprived him of the use of his right eye. The academy of sciences at Paris, which in 1738 had adjudged the prize to his memoir Concerning the Nature and properties of Fire, proposed for the year 1740 the important subject of the sea-tides; a problem whose solution required the most arduous calculations, and comprehended the theory of the solar system. Euler's discourse on this question was adjudged a master-piece of analysis and geometry; and it was more honourable for him to share the academical prize with such illustrious competitors as Colin Maclaurin and Daniel Bernouilli, than to have carried it away from rivals of less magnitude. Rarely, if ever, did such a brilliant competition adorn the annals of the academy; and no subject, perhaps, proposed by that learned body was ever treated with such

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accuracy of investigation and force of genius, as that which here displayed the philosophical powers of these three extraordinary men.

In the year 1741, M. Euler was invited to Berlin to augment the lustre of the academy, that was there rising into fame. He enriched the last volume of the miscellanies (*melanges*), of Berlin with five memoirs, which make an eminent, perhaps the principal, figure in that collection. These were followed with an astonishing rapidity by a great number of important researches, which are scattered through the memoirs of the Prussian academy; of which a volume has been regularly published every year since its establishment in 1744. The labours of Euler will appear more especially astonishing, when it is considered, that while he was enriching the academy of Berlin with a prodigious number of memoirs, on the deepest parts of mathematical science, containing always some new points of view, often sublime truths, and sometimes discoveries of great importance; he did not discontinue his philosophical contributions to the academy of Petersburg, which granted him a pension in 1742, and whose memoirs display the marvellous fecundity of Euler's genius. It was with much difficulty that this great man obtained, in 1766, permission from the king of Prussia to return to Petersburg, where he desired to pass the rest of his days. Soon after his return, which was graciously rewarded by the munificence of Catharine II. he was seized with a violent disorder, which terminated in the total loss of his sight. A cataract, formed in his left eye, which had been essentially damaged by a too ardent application to study, deprived him entirely of the use of that organ. It was in this distressing situation that he dictated to his servant, a tailor's apprentice, who was absolutely devoid of mathematical knowledge, his elements of algebra; which by their intrinsic merit, in point of perspicuity and method, and the unhappy circumstances in which they were composed, have equally excited applause and astonishment. This work, though purely elementary, discovers the palpable characteristics of an inventive genius; and it is here alone that we meet with a complete theory of the analysis of Diophantus.

About this time M. Euler was honoured by the Academy of Sciences at Paris with the place of one of the foreign members of that learned body; and, after this, the academical prize was adjudged to three of his memoirs, *Concerning the Inequalities in the Motions of the Planets*. The two prize questions proposed by the same academy for 1770 and 1772 were designed to obtain from the labours of astronomers a more Perfect Theory of the Moon. M. Euler, assisted by his eldest son, was a competitor for these prizes, and obtained them both. In this last memoir, he reserved for farther consideration several inequalities of the moon's motion, which he could not determine in his first theory, on account of the complicated calculations in which the method he then employed had engaged him. He had the courage afterward to review his whole theory, with the assistance of his son and Messrs Krafft and Lexell, and to pursue his researches until he had constructed the new tables, which appeared, together with the great work, in 1772. Instead of confining himself, as before, to the fruitless integration of three differential equations of the second degree, which are

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furnished by mathematical principles, he reduced them to the three ordinates, which determine the place of the moon; he divided into classes all the inequalities of that planet, as far as they depend either on the elongation of the sun and moon, or upon the eccentricity, or the parallax, or the inclination of the lunar orbit. All these means of investigation, employed with such art and dexterity as could only be expected from an analytical genius of the first order, were attended with the greatest success; and it is impossible to observe, without admiration, such immense calculations on the one hand, and on the other the ingenious methods employed by this great man to abridge them, and to facilitate their application to the real motion of the moon. But this admiration will become astonishment, when we consider at what period and in what circumstances all this was effectuated by M. Euler. It was when he was totally blind, and consequently obliged to arrange all his computations by the sole powers of his memory and his genius. It was when he was embarrassed in his domestic circumstances by a dreadful fire, that had consumed great part of his substance, and forced him to quit a ruined house, of which every corner was known to him by habit, which, in some measure, supplied the place of sight. It was in these circumstances that Euler composed a work which, alone, was sufficient to render his name immortal. The heroic patience and tranquillity of mind which he displayed here, needs no description: and he derived them not only from the love of science, but from the power of religion. His philosophy was too genuine and sublime to stop its analysis at mechanical causes; it led him to that divine philosophy of religion which ennobles human nature, and can alone form a habit of true magnanimity and patience in suffering.

Some time after this, the famous Wentzell, by couching the cataract, restored Mr Euler's sight; but the satisfaction and joy that this successful operation produced, were of short duration. Some instances of negligence on the part of his surgeons, and his own impatience to use an organ, whose cure was not completely finished, deprived him of his sight a second time; and this relapse was accompanied with tormenting pain. He, however, with the assistance of his sons, and of Messrs Krafft and Lexell, continued his labours; neither the loss of his sight nor the infirmities of an advanced age, could damp the ardour of his genius. He had engaged to furnish the academy of Petersburg with as many memoirs as would be sufficient to complete its acts for 20 years after his death. In the space of seven years he transmitted to the academy, by Mr Golfwin, above 70 memoirs, and above 200 more, which were revised and completed by the author of this paper. Such of these memoirs as were of ancient date were separated from the rest, and form a collection that was published in the year 1783, under the title of *Analytical Works*.

Euler's knowledge was more universal than could be well expected in one, who had pursued with such unremitting ardour mathematics and astronomy as his favourite studies. He had made a very considerable progress in medical, botanical, and chemical science. What was still more extraordinary, he was an excellent scholar, and possessed what is generally called *erudition*.

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Eumarides.

dition in a very high degree. He had read, with attention and taste, the most eminent writers of ancient Rome; the civil and literary history of all ages and all nations was familiar to him; and foreigners, who were only acquainted with his works, were astonished to find in the conversation of a man, whose long life seemed solely occupied in mathematical and physical researches and discoveries, such an extensive acquaintance with the most interesting branches of literature. In this respect, no doubt, he was much indebted to a very uncommon memory, which seemed to retain every idea that was conveyed to it, either from reading or from meditation. He could repeat the *Æneid* of Virgil, from the beginning to the end, without hesitation, and indicate the first and last line of every page of the edition he used.

Several attacks of a vertigo, in the beginning of September 1783, which did not prevent his calculating the motions of the aerostatical globes, were, nevertheless, the forerunners of his mild and happy passage from this scene to a better. While he was amusing himself at tea with one of his grandchildren, he was struck with an apoplexy, which terminated his illustrious career at the age of 76. His constitution was uncommonly strong and vigorous: his health was good; and the evening of his long life was calm and serene, sweetened by the fame that follows genius, the public esteem and respect that are never withheld from exemplary virtue, and several domestic comforts which he was capable of feeling and therefore deserved to enjoy.

EULOGY, EULOGIA, in church history. When the Greeks have cut a loaf or piece of bread to consecrate it, they break the rest into little bits, and distribute it among the persons who have not yet communicated, or send it to persons that are absent; and these pieces of bread are what they call *eulogies*. The word is Greek, *εὐλογία*, formed of *eu* bene, "well," and *λεγομαι*, "I say, speak;" q. d. *benedictum*, "blessed."

The Latin church has had something like eulogies for a great many ages; and thence arose the use of their holy bread.

The name *eulogy* was likewise given to loaves or cakes brought to church by the faithful to have them blessed.

Lastly, the use of the term passed hence to mere presents made to a person without any benediction. See the Jesuit Gretser, in his *Treatise de Benedictionibus & Maledictionibus*, lib. ii. cap. 22, 24, &c. where he treats of eulogies thoroughly.

From a passage in Bolandus, on the life of St Melaine, cap. 4. it appears, that eulogies were not only of bread, but any kind of meat blessed and hallowed for that purpose. Add, that almost every body blessed and distributed eulogies; not only bishops and priests, but even hermits, though laymen, made a practice of it. Women also would sometimes send eulogies.

The wine sent as a present was also held an eulogy. Bolandus remarks farther, that the eucharist itself was also called *eulogy*.

EULOGY, likewise means an encomium on any person, on account of some virtue or good quality.

EUMARIDES, of *εὐμαρής* "easy," among the ancients, a kind of shoes common to men and women.—The eumarides were used for pomp and delicacy, being neat, and painted with various colours.

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Eumenes.

EUMENES, a Greek officer in the army of Alexander, son of a charioteer. He was the most worthy of all the officers of Alexander to succeed after the death of his master. He conquered Paphlagonia, and Cappadocia, of which he obtained the government, till the power and jealousy of Antigonus obliged him to retire. He joined his forces to those of Perdiccas, and defeated Craterus and Neoptolemus. Neoptolemus perished by the hands of Eumenes. When Craterus had been killed during the war, his remains received an honourable funeral from the hand of the conqueror; and Eumenes, after weeping over the ashes of a man who once was his dearest friend, sent his remains to his relations in Macedonia. Eumenes fought against Antipater and conquered him; and after the death of Perdiccas his ally, his arms were directed against Antigonus, by whom he was conquered A. U. C. 433, chiefly by the treacherous conduct of his officers. This fatal battle obliged him to disband the greatest part of his army to secure himself a retreat; and he fled only with 700 faithful attendants to a fortified place on the confines of Cappadocia, called *Nora*, where he was soon besieged by the conqueror. He supported the siege for a year with courage and resolution, but some disadvantageous skirmishes so reduced him, that his soldiers, grown desperate, and bribed by the offers of the enemy, had the infidelity to betray him into the hands of Antigonus. The conqueror, from shame or remorse, had not the courage to visit Eumenes; but when he was asked by his officers, in what manner he wished him to be kept, he answered, keep him as carefully as you would keep a lion. This severe command was obeyed; but the asperity of Antigonus vanished in a few days, and Eumenes, delivered from the weight of chains, was permitted to enjoy the company of his friends. Even Antigonus hesitated whether he should not restore to his liberty a man with whom he had lived in the greatest intimacy while both subservient to the command of Alexander; and these secret emotions of pity and humanity were not a little increased by the petitions of his son Demetrius for the release of Eumenes. But the calls of ambition prevailed; and when Antigonus recollected what an active enemy he had in his power, he ordered Eumenes to be put to death in the prison. His bloody commands were executed 315 years before the Christian era. Such was the end of a man who raised himself to power by merit alone. His skill in public exercises first recommended him to the notice of Philip; and under Alexander, his attachment and fidelity to the royal person, and particularly his military accomplishments, promoted him to the rank of a general. Even his enemies revered him; and Antigonus, by whose orders he perished, honoured his remains with a splendid funeral, and conveyed his ashes to his wife and family in Cappadocia. It has been observed, that Eumenes had such an universal influence over the successors of Alexander, that none during his lifetime dared to assume the title of king.

EUMENES I. king of Pergamus, who succeeded his uncle Philetærus about 264 years before Christ. He made war against Antiochus the son of Seleucus, and enlarged his possessions by seizing upon many of the cities of the kings of Syria. He lived in alliance with the Romans, and made war against Prusias king of

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Bithynia.

Eumenes Bithynia. He was a great patron of learning; but being much given to wine, he died of an excess in drinking, after a reign of 22 years. He was succeeded by Attalus.

EUMENES II. succeeded his father Attalus on the throne of Asia and Pergamus. His kingdom was small and poor, but he rendered it powerful and opulent; and his alliance with the Romans did not a little contribute to the increase of his dominions after the victories obtained over Antiochus the Great. He carried his arms against Prusias and Antigonus; and died 160 years before Christ, after a reign of 40 years, leaving the kingdom to his son Attalus II. He has been admired for his benevolence and magnanimity; and his love of learning greatly enriched the famous library of Pergamus, which had been founded by his predecessors in imitation of the Alexandrian collection of the Ptolemies. His brothers were so attached to him and devoted to his interest, that they enlisted among his body-guards to show their fraternal fidelity.

EUMENES, a celebrated orator of Athens about the beginning of the fourth century. Some of his harangues and orations are extant. An historical writer in Alexander's army.

EUMENIDES, a name given to the Furies by the ancients. They sprang from the blood of the wound which Cælus received from his son Saturn. According to others, they were daughters of Earth, and conceived from the blood of Saturn. Some make them daughters of Acheron and Night, or Pluto and Proserpine. According to the more received opinions, they were three in number, Tisiphone, Megara, and Alesto, to which some add Nemesis. Plutarch mentions only one called *Adrastra*, daughter of Jupiter and Necessity. They were supposed to be the ministers of the vengeance of the gods. They were stern and inexorable; and were always employed in punishing the guilty upon earth, as well as in the infernal regions. They inflicted their vengeance upon earth by wars, pestilence, and dissensions, and by the secret stings of conscience; and in hell they punished the guilty by continual flagellation and torments. They were also called *Furie* and *Erinnyes*. Their worship was almost universal; and people dared not to mention their names or fix their eyes upon their temples. They were honoured with sacrifices and libations; and in Achaia they had a temple, which when entered by any one guilty of a crime, suddenly rendered him furious, and deprived him of the use of his reason. In the sacrifices the votaries used branches of cedar and of alder, hawthorn, saffron, and juniper; and the victims were generally turtle-doves and sheep, with libations of wine and honey. They were usually represented with a grim and frightful aspect, with a black and bloody garment, and with serpents wreathing round their head instead of hair. They held a burning torch in one hand, and a whip of scorpions in the other; and were always attended by Terror, Rage, Paleness, and Death. In hell they were seated around Pluto's throne, as the ministers of his vengeance.

EUMENIDIA, festivals in honour of the Eumenides, called by the Athenians *εὐμενίδαι* "venerable goddesses." They were celebrated once every year, with sacrifices of pregnant ewes, with offerings of cakes made by the most eminent youths, and libations of honey

and wine. At Athens none but free-born citizens were admitted, such as had led a life the most virtuous and unfulfilled.

EUMOLPIDES, the priests of Ceres at the celebration of her festivals at Eleusis. They were descended from Eumolpus, a king of Thrace, who was made priest of Ceres by Erechtheus king of Athens. He became so powerful after his appointment to the priesthood, that he maintained a war against Erechtheus. This war proved fatal to both. Erechtheus and Eumolpus were both killed, and peace was re-established among their descendants, on condition that the priesthood ever remained in the family of Eumolpus, and the regal power in the house of Erechtheus. The priesthood remained in the family of Eumolpus for 1200 years; and this is still more remarkable, because he who was once appointed to the holy office was obliged to remain in perpetual celibacy.

EUMOLPUS, a king of Thrace, son of Neptune and Chione. He was thrown into the sea by his mother, who wished to conceal her shame from her father. Neptune saved his life and carried him into Æthiopia, where he was brought up by a woman, one of whose daughters he married. An act of violence to his sister-in-law obliged him to leave Æthiopia, and he fled to Thrace with his son Ismarus, where he married the daughter of Tegyrius the king of the country. This connection to the royal family rendered him ambitious; he conspired against his father-in-law, and fled, when the conspiracy was discovered, to Attica, where he was initiated in the mysteries of Ceres of Eleusis, and made hierophantes or high priest. He was afterwards reconciled to Tegyrius, and inherited his kingdom. He made war against Erechtheus, king of Athens, who had appointed him to the office of high priest, and perished in battle about 1380 years before the Christian era. His descendants were also invested with the priesthood, which remained for about 1200 years in that family.

EUNAPIUS, a native of Sardis in Lydia, a celebrated sophist, physician, and historian, who flourished in the 4th century, under the emperors Valentinian, Valens, and Gratian. He wrote "The lives of the Philosophers and Sophists," in which he frequently shows himself a bitter enemy to the Christians: also a "History of the Cæsars," which he deduced from the reign of Claudius where Herodian left off, down to that of Arcadius and Honorius. The history is lost; but we have the substance of it in Zosimus, who is supposed to have done little more than copy it.

EUNOMIANS, in church-history, Christian heretics in the 4th century. They were a branch of Arians, and took their name from EUNOMIUS bishop of Cyzicus; whose confession of faith here follows, extracted from Cave's *Historia Literaria*, vol. 1. p. 223; "There is one God uncreated and without beginning; who has nothing existing before him, for nothing can exist before what is incarnate; nor with him, for what is uncreate must be one; nor in him, for God is a simple and uncompound being. This one simple and eternal being is God, the creator and ordainer of all things: first indeed and principally of his only begotten Son; and then, through him, of all other things. For God begot, created, and made, the Son, only by his direct operation and power, before all things, and

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Eunomius, Eunuch. every other creature; not producing, however, any being like himself, or imparting any of his own proper substance to the Son: for God is immortal, uniform, indivisible; and therefore cannot communicate any part of his own proper substance to another. He alone is unbegotten; and it is impossible that any other being should be formed of an unbegotten substance. He did not use his own substance in begetting the Son, but his will only: nor did he beget him in the likeness of his substance, but according to his own good pleasure. He then created the Holy Spirit, the first and greatest of all spirits, by his own power indeed and operation mediately, yet by the immediate power and operation of the Son. After the Holy Spirit he created all other things in heaven and in earth, visible and invisible, corporeal and incorporeal, mediately by himself, by the power and operation of the Son," &c.

EUNOMIUS, a famous heresiarch of the 4th century, the disciple of Elius, but abundantly more subtle than his master, as well as more bold in propagating the opinions of his sect, who after him are called **EUNOMIANS**. He was ordained bishop of Cyzicus; but gave so much disturbance by the intemperance of his zeal, that he was deposed more than once. At last, tired with being tossed about, he petitioned to retreat to the place of his birth, Dacora in Cappadocia; where he died very old about the year 374, after experiencing a variety of sufferings. The greatest part of his works are lost. There is, however, besides two or three small pieces, a confession of his faith remaining, which Cave inserted in his *Historia Literaria*, from a manuscript in archbishop Tennison's library. See the preceding article.

EUNUCH, a castrated person. See the article **CASTRATION**.—The word is formed from *εὐνὴ* *χει*, q. d. *lēgi curam habet*, "guardian or keeper of the bed."

In Britain, France, &c. eunuchs are never made but upon occasion of some disease, which renders such an operation necessary: but in Italy they make great numbers of children, from one to three years of age, eunuchs, every year, to supply the operas and theatres of all Europe with singers. M. de la Lande, in his *Voyage d'Italie*, asserts, that there are public shops at Naples where this cruel operation is performed, and that over the door of these shops is inscribed *Qui si castrano ragazzi*. But Dr Burney informs us, that he was not only utterly unable to see or hear of any such shops during his residence in that city, but was constantly told, both by the natives and English settled there, that the laws against such a practice were so numerous and severe, that it was never performed but with the utmost secrecy.

In the eastern parts of the world, they make eunuchs in order to be guards or attendants on their women. The seraglio of the eastern emperors are chiefly served and guarded by eunuchs; and yet, from good authority, we learn, that the rich eunuchs in Persia and other countries keep seraglios for their own use. Those who, out of an imprudent zeal to guard themselves from sensual pleasures, made themselves eunuchs, were, by the council of Nice, condemned and excluded from holy orders. There are several severe prohibitions in Germany against the making of eunuchs; and in France an eunuch must not marry, not even with the consent of the woman.

Though the practice of castration is detestable in every point of view; yet there appears no real foundation for the injurious opinion generally entertained of eunuchs, viz. that they are all cowards, and devoid of genius for literature or any solid study. "As to genius (says the author last quoted), I never found those of the first class in music deficient in intellectual abilities for more serious studies. Indeed I have seen real genius and disposition for literary pursuits, in more than one great opera singer; and as for composition, and the theory of music, not only the best singers of the Pope's chapel ever since the beginning of the last century, but the best composers, are among the sopranis, in that service." With respect to the operation affecting the mind so much as to deprive it of all fortitude in times of danger, there is great reason to doubt the fact: most of the generals of eastern monarchs having been at all times of this class; and the bravest stand that ever was made against Alexander the Great was at Gaza, under the command of one of Darius's generals, who was a eunuch. Ammianus Marcellinus gives an account of Menophilus, a eunuch, to whom Mithridates intrusted his daughter; which proves the possibility of such unfortunate persons possessing a heroism equal to that of the most determined Stoic.

It is very certain, that the ancients never supposed eunuchs to have been men of inferior intellects, or that they possessed less vigour of mind than other men. At least the Persians were not of this opinion; for Herodotus* relates, that when they had taken possession of some Ionian cities, *παῖδας τε τῶν ἐν εἰδεσθῆναι ἐκλεγόμενοι* 32. p. 451. *ἐξεταμίον, καὶ ποιεῖν αὐτῶν εἶναι ἐνορχίας εὐνυχῆς*. It is certain, however, Herodotus†, in relating the melancholy story of Hermotimus, says, that *παρα τοῖσι βαρβαροῖσι τι μωλῆροι εἰσι εἰ εὐνυχῶι, πιστὸς εἰνεκα πάσης, τὸν ἐνορχεῶν*, "among the barbarians, the eunuchs are more valued than other men, on account of their universal fidelity." It appears from this passage of Herodotus, that in Persia eunuchs were far from being objects of contempt; and were even frequently promoted to the highest honours. This was indeed the case with Hermotimus. We find in Agathias, who was one of the Byzantine historians, that a general in the Roman army, named *Narfes*, was a eunuch. This was in the latter ages. In Plutarch's Life of Aristides, Themistocles is related to have chosen an eunuch, whose name was *Arnaces*, from among his prisoners, to send on a secret embassy to Xerxes. This surely may serve to show, that mental imbecility was not supposed by the Greeks to be the characteristic of eunuchism. The same story of the confidence placed in Arnaces, who was one of the Persian king's eunuchs, is related also in the life of Themistocles. Aristotle paid such high respect to Hermias, who was a eunuch and governor of Atarneus, which is in Mysia, that he even offered sacrifices in honour of him; as Lucian informs us in his Dialogue entitled *Eunuchus*. This regard of Aristotle for Hermias has been often celebrated, and is mentioned by Suidas, Harpocratio, and others.

EUNUCHS, in church-history, a sect of heretics in the third century, who were mad enough to castrate, not only those of their own persuasion, but even all others they could lay hold of. They took their rise from the example of Origen, who, misunderstanding the following words of our Saviour, "and eunuchs who made

Eunuch.

Evocati
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Evolvulus.

themselves eunuchs for the kingdom of heaven," castrated himself.

EVOCATI, soldiers among the Romans, who having served their full time in the army, went afterwards volunteers at the request of some favourite general; on which account they were called by the honourable names of *Emeriti* and *Beneficarii*.

EVOCATION (*Evocatio*), among the Romans, a religious ceremony always observed by them at the undertaking a siege, wherein they solemnly called upon the gods and goddesses of the place to forsake it and come over to them. Without the performance of this ceremony, they either thought that the place could not be taken, or that it would be a sacrilege to take the gods prisoners. They always took it for granted that their prayer was heard, and that the gods had deserted the place and come over to them, provided they were able to make themselves masters of it.

EUODIA, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants. The calyx is a tetraphyllous perianthium; the corolla consists of four spathulated, sharp, and open petals; the stamina are four subulated filaments as long as the petals; the pericarpium four, roundish, bivalve, and monospermous capsules; the seeds solitary.

EVOLUTION, in algebra, the unfolding or opening of a curve, and making it describe an evolvent. The word *evolutio* is formed of the preposition *e* "out;" and *volvo* "I roll, or wind;" q. d. an *unwinding*, or *unrolling*.

The equable evolution of the periphery of a circle, or other curve, is such a gradual approach of the circumference to rectitude, as that its parts do all concur and equally evolve or unbend; so that the same line becomes successively a less arc of a reciprocally greater circle; till at last they change into a straight line. In the Philosophical Transactions, N° 260. a new quadratrix to the circle is found by this means, being the curve described by the equable evolution of its periphery.

EVOLUTION, is also used for the extraction of roots out of powers; in which sense it stands opposed to involution. See ALGEBRA, p. 413.

EVOLUTION, in the art of war, the motion made by a body of troops, when they are obliged to change their form and disposition, in order to preserve a post or occupy another, to attack an enemy with more advantage, or to be in a condition of defending themselves the better.

It consists in doublings, counter-marches, conversions, &c. A battalion doubles the ranks, when attacked in front or rear, to prevent its being flanked or surrounded; for then a battalion fights with a larger front. The files are doubled, either to accommodate themselves to the necessity of a narrow ground, or to resist an enemy that attacks them in flank. But if the ground will allow it, conversion is much preferable; because, after conversion, the battalion is in its first form, and opposes the file-leaders, which are generally the best men, to the enemy; and likewise, because doubling the files in a new or not well-disciplined regiment, they may happen to fall into disorder. See DOUBLING.

EVOLVULUS; in botany: A genus of the tetragynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 29th or-

der, *Campanacea*. The calyx is pentaphyllous; the corolla quinquefid and verticillated; the capsule trilocular; the seeds solitary. Euonymus
Eupatridæ.

EUONYMUS, the SPINDLE-TREE: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 43d order, *Dumosa*. The corolla is pentapetalous; the capsule pentagonal, quincelocular, quinquevalved, and coloured; the seeds hooded. There are two species, 1. The europæus, hath an upright woody stem 10 or 15 feet high, garnished with oblong opposite leaves: from the sides of the branches proceed small bunches of greenish quadrid flowers, succeeded by pentagonal capsules, disclosing their seeds in a beautiful manner in autumn. 2. The americanus, or evergreen spindle-tree, hath a shrubby stem, dividing into many opposite branches, rising six or eight feet high, garnished with spear-shaped evergreen leaves growing opposite, and from the sides and ends of the branches. The flowers are quinquefid and whitish, and come out in small bunches, succeeded by roundish, rough, and protuberant capsules, which rarely perfect their seeds in this country. Both these species are hardy, and will succeed in any soil or situation. The berries of the first sort vomit and purge very violently, and are fatal to sheep. If powdered and sprinkled upon hair, they destroy lice. If the wood is cut when the plant is in blossom, it is tough and not easily broken; and in that state it is used by watchmakers for cleaning watches, and for making skewers and tooth-pickers. Cows, goats, and sheep, eat this plant; horses refuse it.

EUPATORIUM, HEMP-AGRIMONY: A genus of the polygamia æqualis order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked; the pappus feathery; the calyx imbricated and oblong; the style semibifid and long. There are 13 species, many of them herbaceous flowery perennials, producing annual stalks from two to three or five feet high, terminated by clusters of compound flowers of a red, purple, or white, colour. They are easily propagated by seeds, or parting the roots in autumn or spring. One species, viz. the cannabinum, or water hemp-agrimony, is a native of Britain. It is found wild by the sides of rivers and ditches, and has pale-red blossoms. It has an acrid smell, and a very bitter taste, with a considerable share of pungency. The leaves are much recommended for strengthening the tone of the viscera, and as an aperient; and said to have excellent effects in the dropsy, jaundice, cachexies, and scorbutic disorders. Boerhaave informs us, that this is the common medicine of the turf-diggers in Holland, against scurvy, foul ulcers, and swellings in the feet, to which they are subject. The root of this plant is said to operate as a strong cathartic: but it is hardly used in Britain, and has no place in our pharmacopœias.

EUPATRIDÆ, in antiquity, a name given by Theseus to the nobility of Athens, as distinguished from the Geomori and Demiurgi. The Eupatridæ, by Theseus's establishment, had the right of choosing magistrates, teaching and dispensing the laws, and interpreting holy and religious mysteries. The whole city, in all other matters, was reduced to an equality. The Geomori were husbandmen, and inferior to the Eupatridæ,

Euphony tridæ in point of fortune; the Demiurgi were artificers, and fell short of the Eupatridæ in number.

EUPHONY, in grammar, an easiness, smoothness, and elegance of pronunciation. The word is formed of *eus*, bene, "well," and *phōnē*, wōnē, "voice." Quintilian calls *euphonia*, "*vocalitas*;" Scagliar, "*facilis pronunciatio*."

Euphonia is properly a kind of figure whereby we suppress a too harsh letter, or convert it into a smoother, contrary to the ordinary rules. There are examples enough in all languages.

EUPHYMISM. See ORATORY.

EUPHORBIA, SPURGE: A genus of the trigynia order, belonging to the dodecandria class of plants; and in the natural method ranking under the 38th order, *Tricocca*. The corolla is tetrapetalous or pentapetalous, placed on the calyx; the calyx is monophyllous and ventricose; the capsule tricoccos. There are 62 species, six of which are natives of Great Britain. They are mostly shrubby and herbaceous succulents, frequently armed with thorns, having stalks from 10 or 12 inches to as many feet in height, with quadripetalous flowers of a whitish or yellow colour. They are easily propagated by cuttings; but the foreign kinds must be always kept in pots in a stove. If kept dry, they may be preserved for several months out of the ground, and then planted, when they will as readily take root as though they had been fresh. The juice of all the species is so acrid, that it corrodes and ulcerates the body wherever it is applied; so that physicians have seldom ventured to prescribe it internally. Warts, or corns, anointed with the juice, presently disappear. A drop of it put into the hollow of an aching tooth, gives relief, like other corrosives, by destroying the nerve. Some people rub it behind the ears, that it may blister.

One of the foreign species, named *esula*, is such a violent corrosive, that, if applied to any part of the body, it produces a violent inflammation, which is soon succeeded by a swelling that degenerates into a gangrene and proves mortal. There is a species at the Cape, which supplies the Hottentots with an ingredient for poisoning their arrows. Their method of making this pernicious mixture, is by first taking the juice extracted from the Euphorbia, and a kind of caterpillar peculiar to another plant which has much the appearance of a species of rhus. They mix the animal and vegetable matter; and after drying it, they point their arrows with this composition, which is supposed to be the most effectual poison of the whole country. The euphorbia itself is also used for this purpose, by throwing the branches into fountains of water frequented by wild beasts, which after drinking the water thus poisoned, seldom get 1000 yards from the brink of the fountain before they fall down and expire. This plant grows from about 15 to 20 feet in height, sending out many branches full of strong spines. The natives cut off as many of the branches as they think necessary for the destruction of the animals they intend to poison. They generally conduct the water a few yards from the spring into a pit made for the purpose; after which they put in the euphorbia, and cover the spring, so that the creatures have no choice. No animal escapes which drinks of such water, though the flesh is not injured by the poison.

EUPHORBIVM, in the materia medica, a gummi-resinous substance, which exudes from a large oriental tree, (*EUPHORBIA officinarum*). It is brought to us immediately from Barbary, in drops of an irregular form; some of which, upon being broken, are found to contain little thorns, small twigs, flowers, and other vegetable matters; others are hollow, without any thing in their cavity: the tears in general are of a pale yellow colour externally, somewhat white within: they easily break between the fingers. Lightly applied to the tongue, they affect it with a very sharp biting taste; and upon being held for some time in the mouth, prove vehemently acrimonious, inflaming and exulcerating the fauces, &c. Euphorbium is extremely troublesome to pulverise; the finer part of the powder, which flies off, affecting the head in a violent manner. The acrimony of this substance is so great as to render it absolutely unfit for any internal use: several correctors have been contrived to abate its virulence; but the best of them are not to be trusted to: and as there seems to be no real occasion for it, unless for some external purposes, we think, with Hoffman and others, that it ought to be expunged from the catalogue of internal medicines. And accordingly it has now no place in the London or Edinburgh pharmacopœias. But it is still retained in most of the foreign ones, and is sometimes used as a sternutatory.

EUPHORBUS, a famous Trojan, son of Panthous. He was the first who wounded Patroclus, whom Hector killed. He perished by the hand of Menelaus, who hung his shield in the temple of Juno at Argos. Pythagoras, the founder of the doctrine of the metempsychosis or transmigration of souls, affirmed that he had been once Euphorbus, and that his soul recollected many exploits which had been done while it animated that Trojan's body. As a further proof of his assertion, he showed at first sight the shield of Euphorbus in the temple of Juno.

EUPHORION of CHALCIS, a poet and historian, born in the 126th Olympiad. Suetonius says that Tiberius composed verses in imitation of Euphorion, Rianus, and Parthenius; with whom he was charmed to such a degree, that he ordered their writings and their pictures to be kept in all the public libraries, among the ancient and celebrated authors.

EUPHRASIA, EYE-BRIGHT: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, *Personate*. The calyx is quadrid and cylindrical; the capsule bilocular, ovato-oblong; the shorter two antheræ, with the base of the one lobe terminated by a small spine. There are seven species; two of which, viz. the officinalis and odontites, are natives of Britain. The first of these, which hath blue flowers, is a weak astringent, and was formerly much celebrated in disorders of the eyes; but the present practice hath not only disregarded its internal, but also its external, use. This plant will not grow but when surrounded by others taller than itself. Cows, horses, goats, and sheep, eat it; swine refuse it.

EUPHRATES, a river universally allowed to take its rise in Armenia Major; but in what particular spot, or in what direction it afterwards shapes its course, there is the greatest disagreement. Strabo says, that the

Euphor-
bium
Euphrates.

See Plate
CLXXXVII.
fig. 1.—Fig.
2. repre-
sent part of
the stem
and flowers
magnified.

Paterfon's
Journey to
the Cape,
p. 62.

^{Euphrates}
^{||}
^{Evremond.} the Euphrates rises in mount Abus, which he joins with, or accounts a part of, mount Taurus; that its beginning is on the north side of mount Taurus; and that running, first westward through Armenia, then striking off to the south, it forces its way through that mountain: and thus it rises in the south of Armenia, mount Taurus being the boundary on that side; and runs through its south part, quite to Cappadocia, conterminal with Armenia Minor; or quite to this last, or to its south limit; to reach which, it must bend its west course a little north; because the Taurus, from which it rose, lies lower, or more to the south, and almost parallel with Melitene: and that then it turns to the south, in order to break through the Taurus, and escape to Syria, and then take a new bend to Babylonia. To this account of Strabo, Pliny runs quite counter; adducing eye-witnesses, who carry the Euphrates from north to south in a right line, till it meets mount Taurus; placing the springs together with mount Abus, or Aba, which inclines to the west, to the north of Taurus. Ptolemy strikes a middle course between both, placing springs to the east, as Strabo does; whence, he says, it runs in a long course westward, before it bends south; and that it rises not from mount Taurus, but far to the north of it; and he makes it run straight west from its rise, then turn south spontaneously, without any interposing obstacle, in a manner quite different from Strabo, Mela, and others, who make the Taurus the cause of this turn. The Euphrates naturally divides into two channels, one through Babylon, and the other through Seleucia, besides the several artificial cuts made between it and the Tigris about Babylon: and these cuts or trenches are what the Psalmist calls the rivers of Babylon, on the willows of which the captives hung their harps. It is probable, that the Euphrates naturally poured into the sea at one particular mouth, before these cuts were made. A thing appearing so evident to the ancients, that Pliny has set down the distance between the mouths of the Euphrates and the Tigris: and he says, some made it 25, and others 7, miles; but that the Euphrates being for a long time back intercepted in its course by cuts, made for watering the fields, only the branch called the *Pastigris* fell into the sea, the rest of it into the Tigris, and both together into the Persian Gulf. Overflowing the country through which it runs, at stated times of the year, like the Nile, it renders it fertile.

EUPOLIS, an Athenian comic poet, flourished about the 85th Olympiad. He took the freedom of the ancient comedy in lashing the vices of the people. He lost his life in a sea-fight between the Athenians and Lacedemonians; and his fate was so much lamented, that after his death it was enacted that no poet should serve in the wars. Some say Alcibiades put him to death for his satirical freedom.

EVREMOND (Charles de St Denis), born at St Denis le Guast in Lower Normandy in 1613, was designed for the gown, and entered on the study of the law; but he soon quitted that, and was made an ensign before he was 16. A military life did not hinder him from cultivating polite literature; and he signalized himself by his politeness and wit as much as by his bravery. The king made him a marechal de camp, and gave him a pension of 3000 livres per annum. He ser-

ved under the duke of Candale in the war of Guienne; and in Flanders, till the suspension of arms was agreed on between France and Spain: he afterwards accompanied cardinal Mazarine when he went to conclude the peace with Don Lewis de Haro, the king of Spain's first minister. He wrote, as he had promised, a long letter to the marquis de Crequi, of this negociation; in which he showed, that the cardinal had sacrificed the honour of France to his own private interest, and rallied him in a very satirical manner. This letter falling into the hands of the cardinal's creatures some time after his death, was represented as a state-crime, and he was obliged to fly to Holland. He had too many friends in England (whither he had taken a tour the year before with the count de Soissons, sent to compliment Charles II. upon his restoration) to make any long stay in Holland; and therefore passed over into England, where he was received with great respect, and admitted into intimate friendship with several persons of distinction. The king gave him a pension of 300 l. a-year. He had a great desire to return to his native country; and, after the peace of Nimeguen, wrote a letter in verse to the king of France to ask leave, but in vain. Upon the death of king Charles, he lost his pension. He did not rely much on king James, though that prince had shown himself extremely kind to him. The revolution was advantageous to him. King William, who had known him in Holland, gave him substantial marks of his favour. He died of a strangury in 1703, aged 90; and was interred in Westminster-abbey, where a monument is erected to his memory. His behaviour was engaging, his humour cheerful, and he had a strong disposition to satire: he professed the Romish religion, in which he was born; but at the bottom was certainly a freethinker. He always spoke of his disgrace with the resolution of a gentleman; and whatever strong desire he had to return to his country, he never solicited the favour with meanness: therefore, when this leave was signified to him unexpectedly in the decline of his life, he replied, that the infirmities of age did not permit him to leave a country where he lived agreeably. There have been many editions of his works: but the best is that of Amsterdam in 1726, in 5 vols 12mo, to which is prefixed his life by Doctor Des Maizeaux; who has also given an accurate English translation of them in 3 vols 8vo.

EURIPIDES, one of the Greek poets who excelled in tragedy, was born about 468 B. C. in the isle of Salamis, whither his father and mother had retired a little before Xerxes entered Attica. He learnt rhetoric under Prodicus, morality under Socrates, and natural philosophy under Anaxagoras; but at 18 years of age abandoned philosophy, in order to apply himself to dramatic poetry. He used to shut himself up in a cave to compose his tragedies, which were extremely applauded by the Greeks. The Athenian army, commanded by Nicias, being defeated in Sicily, the soldiers purchased their lives and liberties by reciting the verses of Euripides; such esteem and veneration had the Sicilians for the pieces wrote by this excellent poet. Socrates, the wisest of the philosophers, set such a value upon them, that they were the only tragedies he went to see acted; and yet his performances seldom gained the prize. Euripides frequent-

Evremond.
Euripides.

Euripus,
Eurocly-
don

ly interperſes through them moral ſentences, and ſevere reflections on the fair ſex; whence he was called the *Woman hater*. He was, nevertheless, married: but the ſcandalous lives of his two wives drew upon him the railleſy of Ariſtophanes, and other comic poets; which occaſioned his retiring to the court of Archelaus, king of Macedon, where he was well received. That prince was fond of learned men, and drew them to him by his liberality. If we may believe Solinus, he made Euripides his miniſter of ſtate, and gave him other extraordinary proofs of his eſteem. He had, however, paſſed but a few years there, when an unhappy accident put an end to his life. He was walking in a wood, and, according to his uſual manner, in deep meditation; when, unfortunately happening upon Archelaus's hounds, he was by them torn in pieces. It is not certain whether his death happened by chance, or through envy of ſome of the great courtiers. However, Archelaus buried him with great magnificence; and the Athenians were ſo much afflicted at his death, that the whole city went into mourning. Of 92 tragedies which he compoſed, only 19 are remaining: the moſt valuable editions of which are thoſe of Aldus, in 1503, 8vo; of Plantin, in 1570, ſexceſimo; of Commelin, in 1597, 8vo; of Paul Stevens, in 1604, 4to; and of Joſhua Barnes, in 1694, folio.

EURIPUS, now the NEGROPONT, a canal or ſtrait which divides the iſland of Eubœa from the continent of Greece. In one place it is ſo narrow, that a galley can ſcarce paſs through it. The agitations of the Euripus were much ſpoken of by the ancients. Some ſay that the canal has a flux and reflux ſix times in 24 hours; others, that it ebbs and flows ſeven times a day; but Livy does not allow this flux and reflux to be ſo regular. Father Babin, a Jeſuit of great learning, who made many obſervations on the ſpot during his long abode in the iſland of Negropont, tells us, that the Euripus is regular in its ebbing and flowing the firſt eight days of the moon: the ſame regularity he obſerved from the 14th to the 20th day inclusive, and in the three laſt days: but in the other days of the lunar month, it is not ſo regular; for it ſometimes ebbs and flows 11, 12, 13, and 14 times in the ſpace of a natural day. In this place, as the ſtory commonly goes, Ariſtotle drowned himſelf out of chagrin, for not being able to account for ſo unuſual a motion.

EURIPUS has ſince become a general name for all ſtraits, where the water is in great motion and agitation.

The ancient circufes had their euripi, which were no other than pits or ditches on each ſide of the courſe, into which it was very dangerous falling with their horſes and chariots as they ran races. The term *euripus* was more particularly applied by the Romans to three canals or ditches which encompassed the circus on three ſides, and which were filled occaſionally to repreſent naumachiz or ſea-battles. The ſame people called their ſmaller fountains or canals in their gardens *euripufes*; and their largeſt, as caſcades, &c. *niles*.

EUROCLYDON, (of *Ευρος* *eaſt-wind*, and *κλυδων* *wave*;) is a ſpecies of wind, of which we have an account only in Acts xvii. 14. and concerning the nature of which critics have been much divided. Bochart, Grotius, Bentley, and others, ſubſtitute another read-

ing, ſupported by the Alexandrian MS. and the Vulgate, viz. *Ευρακλυδων*, or *Euro-aquilo*; but Mr Bryant defends the common reading, and conſiders the *Euroclydon*, i. e. *Ευρος κλυδων*, as an eaſt-wind that cauſes a deep ſea or vaſt inundation. He maintains, in oppoſition to Dr Bentley's reaſoning, who ſuppoſes that the mariners in the ſhip, the voyage of which is recited in this paſſage, were Romans, that they were Greeks of Alexandria, and that the ſhip was an Alexandrian ſhip employed in the traffic of carrying corn to Italy; and therefore, that the mariners had a name in their own language for the particular typhonic or ſtormy wind here mentioned. He alſo ſhows from the paſſage itſelf, that the tempeſtuous wind called *Euroclydon*; beat (*κατ' αυτης*) upon the iſland of Crete; and therefore, as this is a relative expreſſion, referring to the ſituation of the perſon who ſpeaks of it, who was at that time to the windward or ſouth of it, the wind blew upon ſhore, and muſt have come from the ſouth or ſouth-eaſt; which, he adds, is fully warranted by the point where the ſhip was, and the direction it ran in afterwards, which was towards the north and north-weſt.

EUROPA, in fab. hiſt. a daughter of Agenor king of Phœnicia and Telephaſſa. She was ſo beautiful that Jupiter became enamoured of her; and the better to ſeduce her, he aſſumed the ſhape of a bull and mingled with the herds of Agenor, while Europa, with her female attendants were gathering flowers in the meadows. Europa caſſed the beautiful animal; and at laſt had the courage to ſit upon his back. The god took advantage of her ſituation; and with precipitate ſteps retired towards the ſhore, croſſed the ſea with Europa on his back, and arrived ſafe in Crete. Here he aſſumed his original ſhape, and declared his love. The nymph conſented, though ſhe had once made vows of perpetual celibacy; and ſhe became mother of Minos, Sarpedon, and Rhadamanthus. After this diſtinguiſhed amour with Jupiter, ſhe married Alterius king of Crete. This monarch ſeeing himſelf without children by Europa, adopted the fruit of her amours with Jupiter, and always eſteemed Minos, Sarpedon, and Rhadamanthus as his own children. Some ſuppoſe that Europa lived about 1552 years before the Chriſtian era.

EUROPE, one of the quarters of the world, bounded on the north by the Frozen Ocean, on the weſt by the Western Ocean, on the ſouth by the Mediterranean, which ſeparates it from Africa, and by the Archipelago, which divides it in part from Aſia, as alſo by the Black Sea, then by the river Don, till it comes near the river Volga or Wolga, and then it is parted from Aſia by this laſt, and afterwards by the river Oby. Europe is ſituated between Long 9. 35. W. and 72. 25. E. and Lat. 35° and 72° N. It is about 3300 miles in length, from Cape St Vincent in Portugal, to the river Oby in Ruſſia; and 2200 miles in breadth, from Cape Matapan, in the Morea, to the North Cape of Norway. We may judge by this, that it is much leſs than Aſia and Africa: but it is in many things more conſiderable than both.

Europe, excepting a ſmall part of Lapland and Muſcovy, is ſituated in the temperate zone; inſomuch, that we neither feel the extremities of heat nor cold. We cannot boaſt of rich mines of gold, ſilver, and precious ſtones; nor does it produce ſugar or ſpices, nor

Europa,
Europe.

yet

Europe
 ||
 Euryandra.

yet elephants, camels, &c. which we can do without; but produces abundance of corn, pulse, fruits, animals, &c. the most necessary for the use of mankind. In general, it is better peopled and better cultivated than the other quarters; it is more full of cities, towns, and villages, great and small, and its buildings are more solid and more commodious than those of Africa and Asia. The inhabitants are all white; and incomparably more handsome than the Africans, and even than most of the Asiatics. The Europeans surpass both in arts and sciences, especially in those called the *liberal*; in trade, navigation, and in military and civil affairs; being, at the same time, more prudent, more valiant, more generous, more polite, and more sociable than they: and though we are divided into various sects, yet, as Christians, we have infinitely the advantage over the rest of mankind. There are but few places in Europe where they sell each other for slaves; and none where robbery is a profession, as it is in Asia and Africa.

There are several sorts of governments in Europe; as the two empires of Germany and Russia, the kingdoms of England, France, Spain, Portugal, Denmark, Sweden, Poland, Prussia, Sardinia, and the Two Sicilies. The commonwealths are Holland, Switzerland, Venice, Genoa, Ragusa, Lucca, and Geneva. The dukedoms, Tuscany, Savoy, Modena, Mantua, Parma, and Cornwall, &c.

There are five sorts of religions in Europe, viz. the Mahommedan, which is professed in Turkey in Europe; the Greek, of which there are many in the same parts, in all Muscovy, and in several parts of Polish Russia; the Roman Catholic in Spain, Portugal, France, and Italy; the Protestant, though with a considerable difference, in Great Britain, Denmark, Sweden, and Norway. There is a mixture of both the last; in Ireland, Switzerland, Germany, Poland, Hungary, and the Low Countries: besides many Jews, and some idolaters in Lapland and the northern parts of Muscovy.

There are three general languages in Europe: the Latin, of which the Italian, the French, and the Spanish, are dialects; the Teutonic, which is spoken, tho' differently, in Germany, Hungary, Denmark, Sweden, and Great Britain; the Slavonic, which is spoken, tho' greatly disguised, in Muscovy, Poland, Bohemia, and Turkey in Europe. There are some of less extent: as, the Greek; the Proper Hungarian; the Basque; the British, which is spoken in Wales and Bretagne in France; the Irish; and the Laponic.

Europe may be divided into 11 great parts, including their dependencies: 1. Sweden; 2. Denmark and Norway; 3. Russia; 4. Poland; 5. Germany; 6. France; 7. Spain; 8. Italy; 9. Turkey in Europe; 10. Little Tartary; and, 11. The European islands, of which the chief are Great Britain and Ireland. The greatest cities in Europe are, London, Paris, Amsterdam, Constantinople, Moscow, and Rome.

EURYALE, in mythology, one of the Gorgons, daughter of Phorcys, and sister of Medusa: she was subject neither to old age nor death.

EURYANDRA, in botany; A genus of the trigynia order, belonging to the polyandria class of plants. The calyx is a pentaphyllous perianthium, with small, roundish, and concave leaves; the corolla consists of three roundish hollow petals, longer than the calyx.

Nº 121.

The stamina are very many capillary filaments much dilated at the apex; the pericarpium three egg-shaped follicles containing several seeds.

EURYDICE, in fab. hist. the wife of Orpheus, who, flying from Aristæus that endeavoured to ravish her, was slain by a serpent. Her husband went down to the shades, and by the force of his music persuaded Pluto and Proserpine to give him leave to carry back his wife; which they granted, provided he did not look on her till he came to the light; but he breaking the condition, was forced to leave her behind him. See ORPHEUS.

EURYMEDON, (anc. geog.) a noble river running through the middle of Pamphylia; famous for a sea and land fight on the same day, in which the Athenians, under Cimon the son of Miltiades, defeated the Persians. The sea-fight happened first in the sea of Pamphylia, towards Cyprus; the land engagement, the following night on the Eurymedon. Cimon, after defeating the Persian fleet, armed his men with the armour of the captives, and set sail for the enemy, who lay on the banks of the Eurymedon, in the ships taken from the Persians; who on seeing their own ships and their own people in appearance, were off their guard, and thus became an easy conquest.

EURYSTHEUS, a king of Argos and Mycenæ, son of Sthenelus, and Nicippe the daughter of Pelops. Juno hastened his birth by two months, that he might come into the world before Hercules the son of Alcmena, as the younger of the two was doomed by order of Jupiter to be subservient to the will of the other. (*Vide* ALCMENA.) This natural right was cruelly exercised by Eurystheus, who was jealous of the fame of Hercules; and who to destroy so powerful a relation, imposed upon him the most dangerous and uncommon enterprises well known by the name of the *twelve labours of Hercules*. The success of Hercules in achieving those perilous labours alarmed Eurystheus in a greater degree, and he furnished himself with a brazen vessel, where he might secure himself a safe retreat in case of danger. After the death of Hercules, Eurystheus renewed his cruelties against his children, and made war against Ceyx king of Trachinia, because he had given them support, and treated them with hospitality. He was killed in the prosecution of this war by Hyllus the son of Hercules. His head was sent to Alcmena the mother of Hercules; who, mindful of the cruelties which her son had suffered, insulted it, and tore out the eyes with the most inveterate fury. Eurystheus was succeeded on the throne of Argos by Atreus his nephew. The death of Eurystheus happened about 30 years before the Trojan war.

EURYTHMY, in architecture, painting, and sculpture, is a certain majesty, elegance, and easiness, appearing in the composition of divers members or parts of a body, painting, or sculpture, and resulting from the fine proportion of it.

EUSDEN (Laurence), an Irish clergyman, rector of Conesby in Lincolnshire, and poet laureat after the death of Mr Rowe. His first patron was the eminent lord Halifax; whose poem, on the battle of the Boyne, he translated into Latin, and dedicated to his lordship. He was esteemed by the duke of Newcastle, who rewarded an epithalamium he wrote on his marriage with the place of poet laureat. He was the author of many

poetical

Eurydice
 Eusden.

Eusebians
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Eustathians.

poetical pieces, though but little known before his pre-
ferment: he died in 1730.

EUSEBIANS, a denomination given to the sect of
Arians, on account of the favour and countenance
which Eusebius, bishop of Cæsarea, showed and procu-
red for them at their first rise. See ARIANS and EU-
SEBIUS.

EUSEBIUS, surnamed PAMPHILUS, a celebrated
bishop of Cæsarea in Palestine, and one of the most
learned men of his time, was born in Palestine about
the latter end of the reign of Gallienus. He was the
intimate friend of Pamphilus the Martyr; and, after
his death, took his name in honour to his memory. He
was ordained bishop of Cæsarea in 313. He had a con-
siderable share in the contest relating to Arius; whose
cause he, as well as several other bishops of Palestine,
defended, being persuaded that Arius had been un-
justly persecuted by Alexander bishop of Alexandria.
He assisted at the council of Nice in 325; when he
made a speech to the emperor Constantine on his coming
to the council, and was placed next him on his right
hand. He was present at the council of Antioch, in
which Eustathius bishop of that city was deposed; but
though he was chosen by the bishop and people of
Antioch to succeed him, he absolutely refused it. In
335, he assisted at the council of Tyre held against
Anathasius; and at the assembly of bishops at Jerusa-
lem, at the time of the dedication of the church there.
By these bishops he was sent to the emperor Constan-
tine to defend what they had done against Athanasius;
when he pronounced the panegyric made on that em-
peror during the public rejoicings in the beginning of
the 30th year of his reign, which was the last of his
life. Eusebius survived the emperor but a short time,
for he died in 338. He wrote, 1. An Ecclesiastical
History, of which Valetius has given a good edition in
Greek and Latin; 2. The life of Constantine; 3. A
treatise against Hierocles; 4. *Chronicon*; 5. *Prepara-
tiones Evangelicæ*; 6. *De demonstratione Evangelicæ*; of
which there are but 10 books extant out of 20; and
several other works, some of which are lost.

EUSTACHIUS (Bartholomew), physician and
anatomist at Rome, flourished about the year 1550.
His anatomical Plates were discovered there in 1712,
and published in 1714.

EUSTATHIANS, a name given to the Catholics
of Antioch in the 4th century, on occasion of their re-
fusal to acknowledge any other bishop beside St Eusta-
thius, deposed by the Arians.

The denomination was given them during the epif-
copate of Paulinus, whom the Arians substituted to St
Eustathius, about the year 330, when they began to
hold their assemblies apart. About the year 350,
Leontius of Phrygia, called the *eunuch*, who was
an Arian, and was put in the see of Antioch, desired
the Eustathians to perform their service in his church;
which they accepting, the church of Antioch served
indifferently both the Arians and Catholics.

This, we are told, gave occasion to two institutions,
which have subsisted in the church ever since. The first
was psalmody in two choirs; though M. Baillet thinks,
that if they instituted an alternate psalmody between
two choirs, it was between two Catholic choirs, and
not by way of response to an Arian choir. The se-

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cond was the doxology, *Glory be to the Father, and the
Son, and the Holy Ghost.* See DOXOLOGY.

This conduct, which seemed to imply a kind of com-
munion with the Arians, gave great offence to abun-
dant of Catholics, who began to hold separate meet-
ings; and thus formed the schism of Antioch. Upon
this, the rest, who continued to meet in the church,
ceased to be called *Eustathians*, and that appellation
became restrained to the dissenting party. S. Flavia-
nus, bishop of Antioch in 381, and one of his succe-
ssors, Alexander, in 482, brought to pass a coalition, or
reunion, between the Eustathians and the body of the
church of Antioch, described with much solemnity by
Theodoret, *Eocl.* l. iii. c. 2.

EUSTATHIANS were also a sect of heretics in the
fourth century, denominated from their founder Eu-
stathius, a monk so foolishly fond of his own profession,
that he condemned all other conditions of life. Whe-
ther this Eustathius was the same with the bishop of
Sebastia and chief of the Semiarrians, is not easy to
determine.

He excluded married people from salvation; pro-
hibited his followers from praying in their houses; and
obliged them to quit all they had, as incompatible
with the hopes of heaven. He drew them out of the
other assemblies of Christians to hold secret ones with
him, and made them wear a particular habit: he ap-
pointed them to fast on Sundays; and taught them, that
the ordinary fasts of the church were needless, after they
had attained to a certain degree of purity which he
pretended to. He showed great horror for chapels built
in honour of martyrs, and the assemblies held therein.
Several women, seduced by his reasons, forsook their
husbands, and abundance of slaves, deserted their mas-
ters houses. He was condemned at the council of
Gangra in Paphlagonia, held between the years 326
and 341.

EUSTATHIUS, bishop of Thessalonica, in the
12th century, under the reigns of the emperors Ema-
nuel, Alexander, and Andronicus Comnenus. He was
a very eminent grammarian; and wrote commentaries
upon Homer, and Dionysius the geographer. The
best edition of his Commentaries on Homer is that of
Rome, printed in Greek, in 1542, in four volumes
folio. His commentaries on the *Periegesis* of Diony-
sius were printed by Mr Hudson at Oxford; in 1697,
8vo. Eustathius appears to have been alive in the
year 1194.

EUSTATIA, ST EUSTATIA, or *Eustatius*, one of the
Caribbee islands, belonging to the Dutch, and situated in
W. Long. 62. 56. N. Lat. 17. 29. It is little else than
a huge mountain, which formerly has, in all probability,
been a volcano. Its situation is so strong, that it has but
one landing place; and that is fortified in such a man-
ner as to be almost impregnable. Tobacco is the chief
product of the island; and it is cultivated to the very
top of the pyramid, which terminates in a large plain
surrounded with woods, but having a hollow in the
middle, which serves as a large den for wild beasts.
No fewer than 5000 white people and 15,000 ne-
groes subsist on this spot, where they rear hogs, kids,
rabbits, and all kinds of poultry, in such abundance,
that they can supply their neighbours, after having
served themselves.

Eusta-
thians
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Eustatia.

F The

Eustatia.

The first Dutch colony sent to this island consisted of about 1600 people. They were dispossessed by the English from Jamaica in 1665. Soon after, the Dutch and French becoming confederates, the English were expelled in their turn. The French continued to hold a garrison in the island till the treaty of Breda, when it was restored to the Dutch. Soon after the revolution, the French drove out the Dutch, and were in their turn driven out by the English under Sir Timothy Thornhill, with the loss of no more than eight men killed and wounded, though the fort they took mounted 16 guns and was in every other respect very strong. Sir Timothy found it necessary for the protection of the Dutch, to leave a small English garrison in the fort; but he granted the French no terms of capitulation, except for their lives and baggage. By the peace of Ryswic, the entire property of this island was restored to the Dutch.

This island was reduced by the British in the year 1781. Though not 20 miles in circumference, it abounded at that time with riches, by reason of the vast conflux of trade from every other island in these seas. Being a free port, it was open to all the subjects of the belligerent powers; and thus a communication was established among them, through which they were enabled to carry on a commercial correspondence, which greatly mitigated the inconveniences of war. The greatest benefit, however, was reaped by the Dutch; who, by transacting all trading business for other nations, were thus entrusted with numberless commissions, and likewise enjoyed vast profits from the sale of the merchandizes to which they were intitled. At the time the attack was made upon them, they were so little under any apprehensions of such an event, that their ware-houses were not sufficient to contain the quantity of commercial articles imported for sale, and the beach and streets were covered with hogheads of tobacco and sugar. In this situation, Admiral Rodney having received orders to commence hostilities against the Dutch, suddenly appeared before the island with such an armament of sea and land forces, as in its defenceless situation was not only useless but ridiculous. The governor could scarce credit the officer who summoned him to surrender; but being convinced how matters stood, the only possible step was taken, namely, to surrender the whole island, and every thing in it, at discretion. Along with the island there fell into the hands of the captors a ship of 60 guns, with 250 sail of merchantmen, while the value of property on the island was estimated at no less than four millions sterling. This capture became afterwards a subject of discussion in parliament, where the conduct of the British commanders was severely scrutinized by Mr Burke. The admiral and general made their defence in person: but the minority at that time were far from being satisfied; and it was supposed that on the change of ministry a rigid inquiry would have been set on foot, had not the splendor of Admiral Rodney's victory over de Grasse put an end to all thoughts of that nature.

The island of St Eustatius is naturally of such difficult access, as already observed, that it is almost impossible for an enemy to effect a landing if proper care is taken by those who are in possession of it. This very circumstance proved the ruin of the new possessors. The

British, secure in their inaccessible situation, conducted themselves in such a manner as induced the Marquis de Bouille to make an attempt to regain it. Having sailed from Martinico at the head of 2000 men, he arrived, on the 26th of November 1781, off one of the landing places of the island, which was deemed so inaccessible that it had been left without a guard. With much loss and difficulty, however, he landed here with four or five hundred of his people during the night. The appearance of day put an end to his landing any more; and he now saw himself obliged either to relinquish the enterprise or to attack the garrison, which was almost double the number of those he had on the island. He chose the latter; and was favoured in his enterprise by the extreme negligence of his antagonists. A difficult pass, which a few men might have occupied with success against a great number, was left unguarded, which the marquis secured in time, and then pushed forward with the utmost expedition. The British, mistaking a body of Irish troops which attended the French commander for their own comrades, suffered them to approach without thinking of opposing them. They were then exercising on the parade; but were soon made sensible of their fatal mistake by a close discharge from their supposed friends, by which many were killed and wounded. The surprise occasioned by this sudden attack was so great, that no resistance could be made; especially as their commanding officer, colonel Cockburn, who happened at that instant to come upon the parade, was made prisoner. A number of them, however, hastened to the fort with a view of making head against the enemy; but the French had already taken possession of the gate, and prevented the draw-bridge from being raised. They entered the fort; which, being surrendered by those who had taken shelter in it, the rest of the garrison, dispersed in various places, and imagining the number of the enemy to be much greater than it really was, submitted without any opposition. The French commander took this opportunity of showing his disinterestedness in pecuniary matters. Among the spoils that fell into his hands a large sum of money was claimed by the British commanding officer as being his private property, which was generously restored to him: in like manner the property of the Dutch inhabitants was reserved to them, and nothing was allowed to be seized but the produce arising from the sale of prizes that had been taken by the English when they captured the island.

EUSTYLE, in architecture, a sort of building in which the pillars are placed at the most convenient distance one from another, the intercolumniations being just two diameters and a quarter of the column, except those in the middle of the face, before and behind, which are three diameters distant.

EUTERPE, one of the muses, daughter of Jupiter and Mnemosyne. She presided over music, and was looked upon as the inventress of the flute. She is represented as crowned with flowers and holding a flute in her hands: Some mythologists attributed to her the invention of tragedy, more commonly supposed to be the production of Melpomene.

EUTHYMIA, among the Greeks, signified such a disposition, or state of the mind, as could not be ruffled either by good or bad fortune, by sickness or health, good or evil.

Eustatias

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Euthymia.

Eutropius
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Eutyrians

EUTROPIUS (Flavius), a Latin author, in the 4th century, was secretary to Constantine the Great, and afterwards bore arms under the emperor Julian, and followed that prince in his expedition against the Persians. He wrote an Abridgment of the Roman History, from the foundation of Rome to the reign of Valens; the best edition of which is that of Miss Le Fevre, afterwards Madam Dacier, published at Paris for the use of the Dauphin, in 4to, in the year 1683.

EUTYCHIANS, ancient heretics, who denied the duplicity of natures in Christ; thus denominated from Eutyches, the archimandrite, or abbot of a monastery at Constantinople, who began to propagate his opinion A. D. 448. He did not, however, seem quite steady and consistent in his sentiments: for he appeared to allow of two natures, even before the union; which was apparently a consequence he drew from the principles of the Platonic philosophy, which supposes a pre-existence of souls: accordingly, he believed that the soul of Jesus Christ had been united to the divinity before the incarnation; but then he allowed no distinction of natures in Jesus Christ since his incarnation. This heresy was first condemned in a synod held at Constantinople by Flavian, in 448, approved by the council of Ephesus, called *conventus latronum*, in 449, and re-examined, and fulminated, in the general council of Chalcedon in 451. The legates of pope Leo, who assisted at it, maintained, that it was not enough to define, that there were two natures in Jesus Christ, but insisted strenuously, that, to remove all equivocations, they must add these terms, without being changed, or confounded, or divided.

The heresy of the Eutyrians, which made a very great progress throughout the east, at length became divided into several branches. Nicephorus makes mention of no fewer than twelve: some called *Schematici*, or *Apparentes*, as only attributing to Jesus Christ a phantom or appearance of flesh, and no real flesh: others, *Theodosians*, from Theodosius bishop of Alexandria: others, *Jacobites*, from one James (*Jacobus*), of Syria; which branch established itself principally in Armenia, where it still subsists. Others were called *Acephali*, *q. d.* without head; and *Severians*, from a monk called *Severus*, who seized on the see of Antioch in 513. These last were subdivided into five factions, *viz.* *Agnostæ*, who attributed some ignorance to Jesus Christ; the followers of Paul; *Μελανισται*, that is, the black *Angelites*, thus called from the place where they were assembled; and lastly, *Adrites*, and *Cononites*.

EUTYCHIANS was also the name of another sect, half Arian half Eunomian; which arose at Constantinople in the fourth century.

It being then a matter of mighty controversy among the Eunomians at Constantinople, whether or no the Son of God knew the last day and hour of the world, particularly with regard to that passage in the gospel of St Matthew, chap. xxiv. ver. 36. or rather that in St Mark, xiii. 32. where it is expressed, that the Son did not know it, but the Father only; Eutychius made no scruple to maintain, even in writing, that the Son did not know it; which sentiment displeasing the leaders of the Eunomian party, he separated from them, and made a journey to Eunomius, who was then in exile.—That heretic acquiesced fully in Eutychius's

doctrine, and admitted him to his communion. Eunomius dying soon after, the chief of the Eunomians at Constantinople refused to admit Eutychius; who, upon this, formed a particular sect of such as adhered to him, called *Eutyrians*.

This same Eutychius, with one Theopronius, as was said in Sozomen's time, were the occasions of all the changes made by the Eunomians in the administration of baptism; which consisted, according to Nicephorus, in only using one immersion, and not doing it in the name of the Trinity, but in memory of the death of Jesus Christ. Nicephorus calls the chief of that sect, not *Eutychius*, but *Euphyschius*, and his followers *Eunomioeuphyschians*.

EUTYCHIUS, patriarch of Alexandria, lived about the ninth age; and wrote annals in the Arabic language, printed at Oxford in 1658, with a Latin version by Mr Pocock. Selden had printed something of his before.

EUXINE or **BLACK SEA**, forms part of the boundary betwixt Europe and Asia. It receives the Nieper, the Danube, and other large rivers; and extends from 28 to 40 degrees of E. Long, and from 40 to 46 of N. Lat. The ancients imagined this sea to have been originally only a lake or standing pool, which broke first into the Propontis, and then into the Egean, washing away by degrees the earth which first kept it within bounds, and formed the two channels of the Bosphorus Thracius and Hellespont, now the Dardanelles.—It was anciently called the *Asenus*, supposed to be from Ashkenaz the son of Gomer, who is said to have settled near it. This original being forgot in length of time, the Greeks explained it by *inhospitable*, which the word Axenos literally signifies; and therefore, when they came to consider the inhabitants of these coasts as more civilized and hospitable, they changed the name into Euxinus, which it still retains.

EWE, the English name of a female sheep. See **Ovis**.

EWERY, in the British customs, an office in the king's household, to which belongs the care of the table linen, of laying the cloth, and serving up water in silver ewers after dinner.

EX, a river that rises in a barren tract of land, called Exmore, in Somersetshire; and after being joined by several little streams, runs by Tiverton, where there is a stone bridge over the river. About nine miles below Tiverton, it is joined by a pretty large stream called the *Colombton*; and about two miles lower, by another stream formed by the junction of the Horton and Credy. With these additions, it washes the walls of Exeter. At Topsham, above four miles below Exeter, it receives another considerable addition to its stream; two miles farther, it is joined by the Ken; and falls into the ocean at Exmouth, after a course of about 40 miles. Ships of great burden go up to Topsham, from whence vessels of 150 tons are conveyed to the quay at Exeter, by means of an artificial canal. The Ex is navigable for vessels of considerable burden to Topsham. The passage, however, at the mouth of the river, is but narrow, having rocks on the east-side and broad sands on the west; nor is the water on the bar more than six or seven feet deep at low water, but the tide rises 14 or 15 feet, so that it is deep enough at high water. When ships are within the

Eutychius
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Ex.

Ex officio
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Exaltation

bar, they may ride afloat at a place called Starcross, about a mile and an half from the river's mouth; but those that go to Topsham lie a-ground on the ooze at low water.

EX OFFICIO, among lawyers, signifies the power a person has, by virtue of his office, to do certain acts without being applied to. Thus a justice of peace may *ex officio*, at his discretion, take surety of the peace, without complaint made by any person whatsoever.

There was formerly an oath *ex officio*, whereby a supposed offender was compelled in the ecclesiastical court to confess, accuse, or clear himself of a crime; but this law is repealed.

Ex Post Facto, in law, something done after another: thus an estate granted may be good by matter *ex post facto*, that was not so at first, as in case of election.

EXACERBATION. See PAROXYSM.

EXACTION, in law, a wrong done by an officer, or a person in pretended authority, in taking a reward or fee that is not allowed by law.

A person guilty of exaction may be fined and imprisoned. It is often confounded with EXTORTION.

EXACUM, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 20th order, *Rotacea*. The calyx is tetraphyllous; the corolla quadrid, with the tube globular; the capsule two-furrowed, bilocular, polyspermous, and opening at the top.

EXÆRESIS, in surgery, the operation of extracting or taking away something that is hurtful to the human body.

EXAGGERATION, in rhetoric, a kind of hyperbole, whereby things are augmented or amplified, by saying more than the truth, either as to good or bad.

EXAGGERATION, in painting, a method by which the artist, in representing things, changes them too much, or makes them too strong, either in respect of the design or colouring. It differs from *caricaturing*, in that the latter perverts or gives a turn to the features of a face, &c. which they had not; whereas exaggeration only heightens or improves what they had.

EXALTATION, or ELEVATION, is chiefly used in a figurative sense, for the raising or advancing a person to some ecclesiastical dignity; and particularly to the papacy.

EXALTATION of the Cross, is a feast of the Romish church, held on the 14th of September; in memory, as is generally supposed, of this, that the emperor Heraclius brought back the true cross of Jesus Christ on his shoulders, to the place on mount Calvary, from which it had been carried away 14 years before by Cosroe king of Persia, at his taking of Jerusalem, under the reign of the emperor Phocas. The cross was delivered up by a treaty of peace made with Siroe, Cosroe's son. The institution of this treaty is commonly said to have been signalized by a miracle; in that Heraclius could not stir out of Jerusalem with the cross, while he had the imperial vestments on enriched with gold and precious stones; but bore it with ease in a common dress.

But long before the empire of Heraclius, there had

been a feast of the same denomination observed both in the Greek and Latin churches, on occasion of what our Saviour said in St John xii. 32. *And I, if I be exalted, or lifted up, will draw all men unto me.* And again, in ch. viii. ver. 28. *When you have exalted, or lifted up, the Son of Man, then shall ye know that I am he.*

The feast of the dedication of the temple built by Constantine was held, says Nicephorus, on the 14th of September, the day on which the temple had been consecrated, in the year 335; and this feast was also called the *exaltation of the cross*, because it was a ceremony therein, for the bishop of Jerusalem to ascend a high place, built by Constantine for that purpose, in manner of a pulpit, called by the Greeks the *sacred mysteries of God*, or the *holiness of God*, and there hoist up the cross, for all the people to see it.

EXALTATION, in physics, denotes the act, or operation, of elevating, purifying, subtilizing, or perfecting, any natural body, its principles and parts; also the quality or disposition which bodies acquire by such operation. The term *exaltation* has been peculiarly affected by the chemists and alchemists; who, imagining it to have some extraordinary emphasis, are employing it on every occasion.

EXALTATION, in astrology, is a dignity which a planet acquires in certain signs or parts of the zodiac; which dignity is supposed to give it an extraordinary virtue, efficacy, and influence. The opposite sign, or part of the zodiac, is called the dejection of the planet. Thus the 15th degree of Cancer is the exaltation of Jupiter, according to Albumazor, because it was the ascendant of that planet at the time of the creation; that of the sun is in the 19th degree of Aries, and its dejection in Libra; that of the moon is in Taurus, &c. Ptolemy gives the reason of this in his first book De Quadrup.

EXAMINATION, an exact and careful search or inquiry, in order to discover the truth or falsehood of a thing.

Self-EXAMINATION is a point much insisted on by divines, and particularly the ancient fathers, by way of preparation to repentance. St Ignatius reduces it to five points; viz. 1. A returning thanks to God for his benefits. 2. A begging of grace and light, to know and distinguish our sins. 3. A running over all our actions, occupations, thoughts, and words, in order to learn what has been offensive to God. 4. A begging of pardon, and conceiving a sincere sorrow for having displeased him. And, 5. Making a firm resolution not to offend him any more; and taking the necessary precautions to preserve ourselves from it.

EXAMINERS, in chancery, two officers of that court, who examine, upon oath, witnesses produced in causes depending there, by either the complainant or defendant, where the witnesses live in London or near it. Sometimes parties themselves, by particular order, are examined. In the country, above 20 miles from London, on the parties joining in commission, witnesses are examined by commissioners, being usually counsellors or attorneys not concerned in the cause.

EXAMPLE, in a general sense, denotes a copy or pattern.

EXAMPLE, in a moral sense, is either taken for a type, instance, or precedent, for our admonition, that we may be cautioned against the faults or crimes which

Exaltation
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Example.

Example
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Exarch.

others have committed, by the bad consequences which have ensued from them; or example is taken for a pattern for our imitation or a model for us to copy after.

That examples have a peculiar power above the naked precept, to dispose us to the practice of virtue and holiness, may appear, by considering, 1. That they most clearly express to us the nature of our duties in their subjects and sensible effects. General precepts form abstract ideas of virtue; but in examples, virtues are most visible in all their circumstances. 2. Precepts instruct us in what things are our duty; but examples assure us that they are possible. When we see men like ourselves, who are united to frail flesh, and in the same condition with us, to command their passions, to overcome the most glorious and glittering temptations, we are encouraged in our spiritual warfare. 3. Examples, by secret and lively incentive, urge us to imitation. We are touched in another manner by the visible practice of good men, which reproaches our defects, and obliges us to the same zeal which laws, tho' wise and good, will not effect.

The example of our Saviour is most proper to form us to holiness; it being absolutely perfect, and accommodated to our present state. There is no example of a mere man that is to be followed without limitation: But the example of Christ is absolutely perfect; his conversation was a living law: "He was holy, harmless, undefiled, and separate from sinners."

EXAMPLE, in rhetoric, denotes an imperfect kind of induction or argumentation; whereby it is proved, that a thing which happened on some other occasion will happen again on the present one, from the similitude of the cases. As, "The war of the Thebans, against their neighbours the Phocians, was ruinous; consequently, that of the Athenians against their neighbours, will likewise be fatal."

EXANTHEMA, among physicians, denotes any kind of efflorescence or eruption, as the measles, purple spots in the plague, or malignant fevers, &c.

EXARCH, in antiquity, an appellation given, by the emperors of the east, to certain officers sent into Italy, in quality of vicars, or rather prefects, to defend that part of Italy which was yet under their obedience; particularly the city of Ravenna against the Lombards, who had made themselves masters of the greatest part of the rest.

The residence of the exarch was at Ravenna; which city, with that of Rome, were all that was left the emperors. The first exarch was the patrician Boetius, famous for his treatise, *De Consolatione Philosophiæ*; appointed in 568 by the younger Justin. The exarchs subsisted about 185 years, and ended in Eutychius; under whose exarchate the city of Ravenna was taken by the Lombard king Astolphus, or Astolphus.

The emperor Frederic created Heraclius, archbishop of Lyons, a descendant of the illustrious house of Montboissier, exarch of the whole kingdom of Burgundy; a dignity till that time unknown any where but in Italy, particularly in the city of Ravenna.

Homer, Philo, and other ancient authors, give likewise the name *exarchus* to the choragus or master of the fingers, in the ancient choruses, or him who sung first: the word *αρχος*, or *αρχομας*, signifying equally to *begin*, and to *command*.

Exarch
||
Exceptional

EXARCH of a *Diocese* was, anciently, the same with primate. This dignity was inferior to the patriarchal, yet greater than the metropolitan.

EXARCH also denotes an officer, still subsisting in the Greek church; being a kind of deputy or legate *à latere* of the patriarch, whose office it is to visit the provinces allotted him, in order to inform himself of the lives and manners of the clergy; take cognizance of ecclesiastical causes; the manner of celebrating divine service; the administration of the sacraments, particularly confession; the observance of the canons; monastic discipline; affairs of marriages, divorces, &c. but, above all, to take an account of the several revenues which the patriarch receives from several churches; and, particularly, as to what regards the collecting the same.

The exarch, after having greatly enriched himself in his post, frequently rises to the patriarchate itself.

EXARCH is also used, in the eastern church antiquity, for a general or superior over several monasteries; the same that we otherwise call archimandrite; being exempted, by the patriarch of Constantinople, from the jurisdiction of the bishops; as are now the generals of the Romish monastic orders.

EXAUCTORATIO, in the Roman military discipline, differed from the *missio*, which was a full discharge, and took place after they had served in the army 20 years; whereas the *exauctoratio* was only a partial discharge: they lost their pay indeed, but still kept under their colours or *vexilla*, though not under the *aquila* (or eagle), which was the standard of the legion: whence, instead of *Legionarii*, they were called *Subsignari*, and were retained till they had either served their full time, or had lands assigned them. The *exauctoratio* took place after they had served 17 years.

EXCALCEATION, among the Hebrews, was a particular law, whereby a widow, whom her husband's brother refused to marry, had a right to summon him to a court of justice; and, upon his refusal, might excalceate him, that is, pull off one of his shoes, and spit in his face; both of them actions of great ignominy.

EXCELLENCY, a title anciently given to kings and emperors, but now to ambassadors, generals, and other persons who are not qualified for that of *highness*, and yet are to be elevated above the other inferior dignities.

EXCENTRIC, in geometry, a term applied to circles and spheres which have not the same centre, and consequently are not parallel; in opposition to concentric, where they are parallel, having one common centre.

EXCENTRICITY, in astronomy, is the distance of the centre of the orbit of a planet from the centre of the sun; that is, the distance between the centre of the ellipse and the focus thereof.

EXCEPTION, something reserved, or set aside, and not included in a rule.

It is become proverbial, that there is no rule without an exception; intimating, that it is impossible to comprehend all the particular cases, under one and the same maxim. But it is dangerous following the exception preferably to the rule.

EXCEPTION, in law, denotes a stop or stay to an action; and is either dilatory or peremptory, in proceedings.

Excerpt
Exchange.

ceedings at common law; but in chancery it is what the plaintiff alleges against the sufficiency of an answer, &c.

An exception is no more than the denial of what is taken to be good by the other party, either in point of law or pleading. The counsel in a cause are to take all their exceptions to the record at one time, and before the court has delivered any opinion of it.

EXCERPT, in matters of literature. See EXTRACT.

EXCESS, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the lesser is taken from or out of the greater.

EXCHANGE, in a general sense, a contract or agreement, whereby one thing is given or exchanged for another.

EXCHANGE, in commerce, is the receiving or paying of money in one country for the like sum in another, by means of bills of exchange.

The security which merchants commonly take from one another when they circulate their business, is a bill of exchange, or a note of hand: these are looked upon as payment. See BILL, and *Mercantile Laws*.

The punctuality of acquitting these obligations is essential to commerce; and no sooner is a merchant's accepted bill protested, than he is considered as a bankrupt. For this reason, the laws of most nations have given very extraordinary privileges to bills of exchange. The security of trade is essential to every society; and were the claims of merchants to linger under the formalities of courts of law when liquidated by bills of exchange, faith, confidence, and punctuality, would quickly disappear, and the great engine of commerce would be totally destroyed.

A regular bill of exchange is a mercantile contract, in which four persons are concerned, viz. 1. The drawer, who receives the value: 2. His debtor, in a distant place, upon whom the bill is drawn, and who must accept and pay it: 3. The person who gives value for the bill, to whose order it is to be paid: and, 4. The person to whom it is ordered to be paid, creditor to the third.

By this operation, reciprocal debts, due in two distant parts, are paid by a sort of transfer, or permutation of debtors and creditors.

(A) in London is creditor to (B) in Paris, value 100*l*. (C) again in London is debtor to (D) in Paris for a like sum. By the operation of the bill of exchange, the London creditor is paid by the London debtor; and the Paris creditor is paid by the Paris debtor; consequently, the two debts are paid, and no money is sent from London to Paris nor from Paris to London.

In this example, (A) is the drawer, (B) is the acceptor, (C) is the purchaser of the bill, and (D) receives the money. Two persons here receive the money, (A) and (D); and two pay the money, (B) and (C); which is just what must be done when two debtors and two creditors clear accounts.

This is the plain principle of a bill of exchange. From which it appears, that reciprocal and equal debts only can be acquitted by them.

When it therefore happens, that the reciprocal debts of London and Paris (to use the same example) are

not equal, there arises a balance on one side. Suppose London to owe Paris a balance, value 100*l*. How can this be paid? Answer, It may either be done with or without the intervention of a bill.

With a bill, if an exchanger, finding a demand for a bill upon Paris for the value of 100*l*. when Paris owes no more to London, sends 100*l*. to his correspondent at Paris in coin, at the expence (suppose) of 1*l*. and then, having become creditor on Paris, he can give a bill for the value of 100*l*. upon his being repaid his expence, and paid for his risk and trouble.

Or it may be paid without a bill, if the London debtor sends the coin himself to his Paris creditor, without employing an exchanger.

This last example shows of what little use bills are in the payment of balances. As far as the debts are equal, nothing can be more useful than bills of exchange; but the more they are useful in this easy way of business, the less profit there is to any person to make a trade of exchange, when he is not himself concerned either as debtor or creditor.

When merchants have occasion to draw and remit bills for the liquidation of their own debts, active and passive, in distant parts, they meet upon 'Change; where, to pursue the former example, the creditors upon Paris, when they want money for bills, look out for those who are debtors to it. The debtors to Paris again, when they want bills for money, seek for those who are creditors upon it.

This market is constantly attended by brokers, who relieve the merchant of the trouble of searching for those he wants. To the broker every one communicates his wants, so far as he finds it prudent; and by going about among all the merchants, the broker discovers the side upon which the greater demand lies, for money or for bills.

He who is the demander in any bargain, has constantly the disadvantage in dealing with him of whom he demands. This is no where so much the case as in exchange, and renders secrecy very essential to individuals among the merchants. If the London merchants want to pay their debts to Paris, when there is a balance against London, it is their interest to conceal their debts, and especially the necessity they may be under to pay them; from the fear that those who are creditors upon Paris would demand too high a price for the exchange over and above par.

On the other hand, those who are creditors upon Paris, when Paris owes a balance to London, are as careful in concealing what is owing to them by Paris, from the fear that those who are debtors to Paris would avail themselves of the competition among the Paris creditors, in order to obtain bills for their money, below the value of them, when at par. A creditor upon Paris, who is greatly pressed for money at London, will willingly abate something of his debt, in order to get one who will give him money for it.

From the operation carried on among merchants upon 'Change, we may discover the consequence of their separate and jarring interests. They are constantly interested in the state of the balance. Those who are creditors on Paris, fear the balance due to London; those who are debtors to Paris, dread a balance due to Paris. The interest of the first is to dissemble what they fear; that of the last, to exaggerate what they wish.

Exchange. wish. The brokers are those who determine the course of the day; and the most intelligent merchants are those who dispatch their business before the fact is known.

Now, how is trade in general interested in the question, Who shall outwit, and who shall be outwitted, in this complicated operation of exchange among merchants?

The interest of trade and of the nation is principally concerned in the proper method of paying and receiving the balances. It is also concerned in preferring a just equality of profit and loss among all the merchants, relative to the real state of the balance. Unequal competition among men engaged in the same pursuit, constantly draws along with it bad consequences to the general undertaking; and secrecy in trade will be found, upon examination, to be much more useful to merchants in their private capacity, than to the trade they are carrying on.

Merchants endeavour to simplify their business as much as possible; and commit to brokers many operations which require no peculiar talents to execute. This of exchange is of such a nature, that it is hardly possible for a merchant to carry on the business of his bills, without their assistance, upon many occasions. When merchants come upon 'Change, they are so full of fear and jealousies, that they will not open themselves to one another, lest they should discover what they want to conceal. The broker is a confidential man, in some degree, between parties, and brings them together.

Besides the merchants who circulate among themselves their reciprocal debts and credits arising from their importation and exportation of goods, there is another set of merchants who deal in exchange; which is the importation and exportation of money and bills.

Were there never any balance on the trade of nations, exchangers and brokers would find little employment: reciprocal and equal debts would easily be transacted openly between the parties themselves. No man feigns and dissembles, except when he thinks he has an interest in so doing.

But when balances come to be paid, exchange becomes intricate; and merchants are so much employed in particular branches of business, that they are obliged to leave the liquidation of their debts to a particular set of men, who make it turn out to the best advantage to themselves.

Exchange. Whenever a balance is to be paid, that payment costs, as we have seen, an additional expence to those of the place who owe it, over and above the value of the debt.

If, therefore, this expence be a loss to the trading man, he must either be repaid this loss by those whom he serves, that is, by the nation; or the trade he carries on will become less profitable.

Every one will agree, that the expence of high exchange upon paying a balance is a loss to a people; no way to be compensated by the advantages they reap from enriching the few individuals among them who gain by contriving methods to pay it off; and if an argument is necessary to prove this proposition, it may be drawn from this principle, viz. whatever renders the profit upon trade precarious or uncertain, is a loss to trade in general: this loss is the consequence of high exchange; and although a profit does result from it upon one branch of trade, the exchange-business, yet that cannot compensate the loss upon every other.

We may, therefore, here repeat what we have said above, that the more difficulty is found in paying a balance, the greater is the loss to a nation.

The Course of Exchange.

THE course of exchange is the current price betwixt two places, which is always fluctuating and unsettled, being sometimes above and sometimes below par, according to the circumstances of trade.

When the course of exchange rises above par, the country where it rises may conclude for certain, that the balance of trade runs against them. The truth of this will appear, if we suppose Britain to import from any foreign place goods to the value of 100,000*l.* at par, and export only to the value of 80,000*l.* In this case, bills on the said foreign place will be scarce in Britain, and consequently will rise in value; and after the 80,000*l.* is paid, bills must be procured from other places at a high rate to pay the remainder, so that perhaps 120,000*l.* may be paid for bills to discharge a debt of 100,000*l.*

Though the course of exchange be in a perpetual flux, and rises or falls according to the circumstances of trade; yet the exchanges of London, Holland, Hamburgh, and Venice, in a great measure regulate those of all other places in Europe.

I. Exchange with Holland.

M O N E Y - T A B L E.

	Par in Sterling.	s.	d.
8 Pennings, or 2 duytes,	1 groat or penny =	0	0.54
2 Groats, or 16 pennings,	1 stiver =	0	1.09
6 Stivers, or 12 pence,	1 schilling =	0	6.56
20 Schillings,	1 pound Flemish =	10	11.18
20 Stivers, or 40 pence,	1 guilder or florin =	1	9.86
6 Guilders, or florins,	1 pound Flemish =	10	11.18
2½ Guilders, or florins,	1 rixdollar =	4	6.66

In Holland there are two sorts of money, bank and current. The bank is reckoned good security; demands on the bank are readily answered; and hence bank-money is generally rated from 3 to 6 per cent.

better than the current. The difference between the bank and current money is called the *agio*.

Bills on Holland are always drawn in bank-money; and if accounts be sent over from Holland to Britain in current

Exchange. current money, the British merchant pays these accounts by bills, and in this case has the benefit of the agio.

PROB. I. *To reduce bank-money to current money.*

RULE. As 100 to 100+agio, so the given guilders to the answer.

EXAMP. What will 2210 guilders in bank-money amount to in Holland currency, the agio being $3\frac{1}{8}$ per cent.?

$$\begin{array}{r} \text{As } 100 : 103\frac{1}{8} :: 2210 \\ \quad 8 \quad 8 \quad 825 \\ \hline 800 \quad 825 \quad 11050 \\ \quad \quad \quad 4420 \\ \quad \quad \quad 17680 \\ \hline \text{Guild. } \text{fl. } \text{pen.} \\ 8100 \quad 18232 \quad 50(2279 \quad 1 \quad 4.\text{cur.} \\ \quad \quad \quad 16 \dots 20 \end{array}$$

$$\begin{array}{r} 22 \quad 10 \quad 00(\\ \quad 16 \quad 8 \\ \hline \end{array}$$

$$\begin{array}{r} 63 \quad 2 \\ \hline 56 \quad 16 \\ \hline 72 \quad 32 \\ \hline 72 \quad 32 \end{array}$$

Or, by practice,

$$\begin{array}{r} 50)2210 \\ \quad 44.2 \quad = 2 \text{ per cent.} \\ \quad 22.1 \quad = 1 \text{ per cent.} \\ \quad 2.7625 = \frac{1}{8} \text{ per cent.} \end{array}$$

$$2279.0625$$

If the agio only be required, make the agio the middle term, thus:

Gail. fl. pen.

As 100 : $3\frac{1}{8}$:: 2210 : 69 1 4 agio. Or, work by practice, as above.

PROB II. *To reduce current money to bank-money.*

RULE. As 100+agio to 100, so the given guilders to the answer.

EXAMPLE. What will 2279 guilders 1 stiver 4 pennings, Holland currency, amount to in bank-money, the agio being $3\frac{1}{8}$ per cent.?

$$\begin{array}{r} \text{Guild. } \text{Guild. } \text{Guild. } \text{fl. } \text{pen.} \\ \text{As } 103\frac{1}{8} : 100 :: 2279 \quad 1 \quad 4 \\ \quad 8 \quad 8 \quad 20 \\ \hline \text{b} \quad \quad \quad \\ 825 \quad 800 \quad 45581 \\ \quad 20 \quad \quad 16 \\ \hline 16500 \quad 273490 \\ \quad 16 \quad 45581 \\ \hline 990 \quad 729300 \\ 165 \quad 800 \\ \hline 8)264000 \quad 8)583440000 \\ \quad 3)33 \quad \quad 3)72930 \text{ Guild.} \\ \quad 11 \quad \quad 11)24310(2210 \text{ bank.} \end{array}$$

N^o 122.

In Amsterdam, Rotterdam, Middleburgh, &c. books and accounts are kept by some in guilders stivers and pennings, and by others in pounds shillings and pence Flemish.

Britain gives 1 l. Sterling for an uncertain number of shillings and pence Flemish. The par is 1 l. Sterling for 36.59 s. Flemish; that is, 1 l. 16 s. 7.08 d. Flemish.

When the Flemish rate rises above par, Britain gains and Holland loses by the exchange, and *vice versa*.

Sterling money is changed into Flemish, by saying,

As 1 l. Sterling to the given rate,

So is the given Sterling to the Flemish sought.

Or, the Flemish money may be cast up by practice.

Dutch money, whether pounds, shillings, pence Flemish, or guilders, stivers, pennings, may be changed into Sterling, by saying,

As the given rate to 1 l. Sterling,

So the given Dutch to the Sterling sought.

EXAMPLE. 1. A merchant in Britain draws on Amsterdam for 782 l. Sterling: How many pounds Flemish, and how many guilders, will that amount to, exchange at 34 s. 8 d. per pound Sterling?

Decimally.

$L. \quad s. \quad d.$	$L.$	$L. \quad s. \quad d.$
If 1 : 34 8 :: 782		If 1 : 34.6 :: 782
12		782
416		693
782		27733
832		242666
3328		210)27109.3
2912		L. 1355 9 4 Flem.
12)325312		
210)27109 4		
L. 1355 9 4 Flem.		

By practice.

$$\begin{array}{r} L. \quad s. \quad d. \\ 782 \\ 10s. = \frac{1}{2} \quad 391 \\ 4s. = \frac{1}{5} \quad 156 \quad 8 \\ 8d. = \frac{1}{8} \quad 26 \quad 1 \quad 4 \\ \hline 1355 \quad 9 \quad 4 \text{ Fl.} \end{array}$$

Or thus:

$$\begin{array}{r} L. \quad s. \quad d. \\ 782 \\ 14s. = \frac{7}{10} \quad 547 \quad 8 \\ 8d. = \frac{1}{10} \quad 26 \quad 1 \quad 4 \\ \hline 1355 \quad 9 \quad 4 \text{ Fl.} \end{array}$$

Multiply the Flemish pounds and shillings by 6, and the product will be guilders and stivers; and if there be any pence, multiply them by 8 for pennings; or, divide the Flemish pence by 40, and the quot will be guilders, and the half of the remainder, if there be any, will be stivers, and one penny odd will be half a stiver, or 8 pennings, as follows:

$$\begin{array}{r} L. \quad s. \quad d. \\ 1355 \quad 9 \quad 4 \\ \quad 6 \\ \hline \text{Flem. pence.} \\ 410)325312(32 \text{ rem.} \end{array}$$

Guild. 8132 16 fliv. Guild. 8132 16 fliv.

2. Change 59 l. 5 s. Flemish into Sterling money, exchange at 37 s. 6 d. Flemish per l. Sterling.

IF

E X C

[49]

E X C

Exchange.

Flem. Ster. Flem.
s. d. L. L. s.
If 37 6 : 1 :: 591 5
2 20

5) 75 11025
2
4) 15 5) 23650
3 5) 4730
3) 946

L. s. d. 315 1/2
Ans. 315 5 8 Ster.

Decimally.
5) L. L. 5) L.
If 1.875 : 1 :: 591.25
5) .375 5) 118.25
5) .075 5) 23.65
.015 .015) 4.73(313.3
45

23
15
80
75
50
45
*5

Holland exchanges with other nations as follows,
viz. with

Flem. d.
Hamburgh, on the dollar, = 66 2/3
France, on the crown, = 54
Spain, on the ducat, = 109 4/5
Portugal, on the crusade, = 50
Venice, on the ducat, = 93
Genoa, on the pezzo, = 100
Leghorn, on the piaftre, = 100
Florence, on the crown, = 120
Naples, on the ducat, = 74 1/3
Rome, on the crown, = 136
Milan, on the ducat, = 102
Bologna, on the dollar, = 94 4/5

Exchange between Britain and Antwerp, as also the
Auftrian Netherlands, is negotiated the same way as
with Holland; only the par is somewhat different, as
will be described in article 2d, following.

II. Exchange with Hamburgh.

MONEY-TABLE.

Par in Sterling. s. d.
12 Pennings } 1 schilling-lub = 0 1 1/4
16 Schilling-lubs } 1 mark = 1 6
2 Marks } 1 dollar = 3 0
3 Marks } 1 rixdollar = 4 6
6 1/2 Marks } 1 ducat = 9 4 1/2

Books and accounts are kept at the bank, and by
most people in the city, in marks, schilling-lubs, and
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phennings; but some keep them in pounds, schillings, Exchange.
and groots Flemish.

The agio at Hamburgh runs between 20 and 40
per cent. All bills are paid in bank-money.

Hamburgh exchanges with Britain by giving an un-
certain number of schillings and groots Flemish for the
pound Sterling. The groot or penny Flemish here, as
also at Antwerp, is worth 5/8 of a penny Sterling; and
fo something better than in Holland, where it is only
1/10 d. Sterling.

Flemish.
6 Pennings } 1 groot or penny
6 Schilling-lubs } 1 schilling
1 Schilling-lub } make { 2 pence or groots
1 Mark } 32 pence or groots
7 1/2 Marks } 1 pound.

The par with Hamburgh, and also with Antwerp,
is 35s. 6 2/3 d. Flemish for 1l. Sterling.

EXAMPLES. 1. How many marks must be received
at Hamburgh for 300 l. Sterling, exchange at 35s. 3 d.
Flemish per l. Sterling?

L. s. d. L.
If 1 : 35 3 :: 300
12

423
300
M. sch.
32) 126900(3965 10
96...
309
288
210
192
180
160
(20)
16
320
32
(0)
Decimally.

Flem. s. Marks. Flem. s.
If 20 : 7.5 :: 35.25
4 : 1.5 :: 35.25
1.5

17625
3525
4) 52.875

Marks in 1l. Sterling 13.21875
300

Marks in 300l. Sterling 3965.62500
16

3750
625

Schilling-lubs 10.000

G

2. How

Exchange. 2. How much Sterling money will a bill of 3965 mark 10 schilling-lubs amount to, exchange at 35s. 3d. Flemish *per* pound Sterling?

Fl.s. d. L.St. Mks sch.
If 35 3 : 1 :: 3965 10
12 32 2

423 7930 20d.

423)126900(300l. ster.
1269

Decimally.

4 : 1.5 :: 35.25

15

17625

2225

4)52.875(13.21875

13.21875)3965.62500(300l. ster.
3965625

III. Exchange with France.

MONEY-TABLE.

Par in Ster. s. d.
12 Deniers } make { 1 fol = 0 0 $\frac{3}{8}$
20 Sols } { 1 livre = 0 9 $\frac{3}{4}$
3 Livres } { 1 crown = 2 5 $\frac{1}{4}$

At Paris, Rouen, Lyons, &c. books and accounts are kept in livres, sols, and deniers; and the exchange with Britain is on the crown, or ecu, of 3 livres, or 60 sols Tournois. Britain gives for the crown an uncertain number of pence, commonly between 30 and 34, the par, as mentioned above, being 29 $\frac{1}{4}$ d.

EXAMPLE. 1. What Sterling money must be paid in London to receive in Paris 1978 crowns 25 sols, exchange at 31 $\frac{1}{8}$ d. *per* crown?

Sols. d. Cr. sols.
If 60 : 31 $\frac{1}{8}$:: 1978 25

253

118705

253

356115

593525

237410

60)30032365 Rem.

8)500539 3

12)62567 11

20)52113 13

L. 260 13 11 $\frac{1}{8}$ Ans.

By Practice.

Cr. Sols.
1978 25, at 31 $\frac{1}{8}$ d.

d.

30 = $\frac{1}{8}$

1 $\frac{1}{2}$ = $\frac{1}{20}$

$\frac{1}{8}$ = $\frac{1}{16}$

Sols 20 = $\frac{1}{3}$

5 = $\frac{1}{4}$

247 5 0

12 7 3

1 0 7 $\frac{1}{2}$

0 0 10 $\frac{1}{2}$

0 0 2 $\frac{1}{4}$

260 13 11 $\frac{1}{8}$

If you work decimally, say,

Cr. d. Ster. Cr. d. Ster.

As 1 : 31.625 :: 1978.416 : 62567.427033

2. How many French livres will L. 121 : 18 : 6 Sterling amount to, exchange at 32 $\frac{1}{2}$ d. *per* crown?

d. Liv. L. s. d.

If 32 $\frac{1}{2}$: 3 :: 121 18 6

263 8 20

24 2438

12

29262

24

117048

58524

Liv. sols. den.

263)702288(2670 5 11 Ans.

Rem. (78 = 5 sols 11 deniers.

IV. Exchange with Portugal.

MONEY-TABLE.

Par in Ster. s. d. f.
1 ree = 0 0 0.27
400 rees } make { 1 crusade = 2 3
1000 rees } { 1 milree = 5 7 $\frac{1}{2}$

In Lisbon, Oporto, &c. books and accounts are generally kept in rees and millrees; and the millrees are distinguished from the rees by a mark set between them thus, 485 v 372; that is, 485 millrees and 372 rees.

Britain, as well as other nations, exchanges with Portugal on the millree; the par, as in the table, being 67 $\frac{1}{2}$ d. Sterling. The course with Britain runs from 63d. to 68d. Sterling *per* millree.

EXAMPLE. 1. How much Sterling money will pay a bill of 827 v 160 rees, exchange at 63 $\frac{1}{8}$ d. Sterling *per* millree?

Rees. d. Rees.

If 1000 : 63 $\frac{1}{8}$:: 827.160

8 507

8000 507 579012

413580

8000)419370.120 2

12) 52421 — 5d.

20) 4368 — 8s.

L. 218 8 5 $\frac{1}{4}$ Ans.

By Practice.

Rees.

827.160, at 63 $\frac{1}{8}$ d.

d.

60 = $\frac{1}{4}$

3 = $\frac{1}{20}$

$\frac{1}{8}$ = $\frac{1}{16}$

$\frac{1}{4}$ = $\frac{1}{4}$

206.790

10.3395

.861625

.4308125

218.4219375

E X C

[51]

E X C

Exchange. The rees being thousandth-parts of the millrees, are annexed to the integer, and the operation proceeds exactly as in decimals.

2. How many rees of Portugal will 500 l. Sterling amount to, exchange at 5s. 4 $\frac{1}{2}$ d. per millree?

d.	Rees.	L.
If 64 $\frac{1}{2}$:	1000 ::	500
— 8	— 20	—
517	8000	10000
	12	—
	120000	—
	8000	—
	—	Rees.
517	960000000	(1856.866 Anf.

V. Exchange with Spain.

MONEY-TABLE.

	Par in Ster.	s.	d.
35 mervadies	} make {	1 rial	= 0 5 $\frac{3}{8}$
8 rials		1 piaftre	= 3 7
375 mervadies		1 ducat	= 4 11 $\frac{1}{4}$

In Madrid, Bilboa, Cadiz, Malaga, Seville, and most of the principal places, books and accounts are kept in piaftres, called also *dollars*, rials, and mervadies; and they exchange with Britain generally on the piaftre, and sometimes on the ducat. The course runs from 35d. to 45d. Sterling for a piaftre or dollar of 8 rials.

EXAMP. 1. London imports from Cadiz goods to the value of 2163 piaftres and 4 rials: How much Sterling will this amount to, exchange at 38 $\frac{1}{2}$ d. Sterling per piaftre?

d.	Piaft. Rials.	Rials.	d.
24 = $\frac{1}{100}$	2163 4, at 38 $\frac{1}{2}$ d.	4 =	38 $\frac{1}{2}$ each.
12 = $\frac{1}{50}$	216 6		
2 = $\frac{1}{25}$	108 3		
$\frac{2}{8}$ = $\frac{1}{4}$	18 0 6		
$\frac{1}{8}$ = $\frac{1}{8}$	2 5 0 $\frac{3}{4}$		
	1 2 6 $\frac{3}{8}$		
	345 17 1 $\frac{1}{8}$		
	1 7 $\frac{3}{10}$		
	L. 345 18 8 $\frac{1}{10}$	Anf.	

2. London remits to Cadiz 345 l. 18s. 8 $\frac{1}{10}$ d. How much Spanish money will this amount to, exchange at 38 $\frac{1}{2}$ d. Sterling per piaftre?

d. Piaft. L. s. d.
If 38 $\frac{1}{2}$: 1 :: 345 18 8 $\frac{1}{10}$

307	20	614	1328389 (2163 piaftres.
2	6918	1228	...
614	12	1003	
	83024	614	
	16	3898	
	498149	3684	
	83024	2149	
Carried up	1328389	1842	
		307	
		8	

Piaft. Rials.
Anf. 2163 4 2456 (4 rials.
2456

VI. Exchange with Venice.

MONEY-TABLE.

5 $\frac{1}{2}$ Soldi } make } 1 gros
24 Gros } make } 1 ducat = 50 $\frac{1}{4}$ d. Sterling.
The money of Venice is of three sorts, viz. two of bank money, and the picoli money. One of the banks deals in banco money, and the other in banco current. The bank money is 20 per cent. better than the banco current, and the banco current 20 per cent. better than the picoli money. Exchanges are always negotiated by the ducat banco, the par being 4s. 2 $\frac{1}{4}$ d. Sterling, as in the table.

Though the ducat be commonly divided into 24 gros, yet bankers and negotiators, for facility of computation, usually divide it as follows, and keep their books and accounts accordingly.

12 Deniers d'or } make } 1 fol d'or
20 Sols d'or } make } 1 ducat = 50 $\frac{1}{4}$ d. Sterling.
The course of exchange is from 45d. to 55d. Sterling per ducat.

EXAMP. 1. How much Sterling money is equal to 1459 ducats 18 fols 1 denier, bank-money of Venice, exchange at 52 $\frac{1}{4}$ d. Sterling per ducat?

Duc. d.	Duc. fol. den.	d.
If 1 : 52 $\frac{1}{4}$:: 1459 18 1		52 $\frac{1}{4}$ rate.
	52 $\frac{1}{4}$	Sols.
	2918	10 = $\frac{1}{2}$
	7295	5 = $\frac{1}{2}$
		2 = $\frac{1}{2}$
		1 = $\frac{1}{2}$
d. 75868	den. 1 = $\frac{1}{2}$	26 $\frac{1}{8}$
$\frac{1}{2}$ = 729 $\frac{4}{8}$		13 $\frac{1}{8}$
$\frac{1}{4}$ = 364 $\frac{6}{8}$		5 $\frac{2}{8}$
		2 $\frac{5}{8}$
		0 $\frac{2}{8}$
		47 $\frac{5}{8}$
	76962 $\frac{2}{8}$	
	47 $\frac{5}{8}$	
	Rem.	
	12)77010(6d.	
	210)64117(17s.	

L. 320 17 6 Sterling, Anf.
G 2

2. How

Exchange. 2. How many ducats at Venice are equal to 385 l.
12 s. 6 d. Sterling, exchange at 4 s. 4 d. per ducat?

L.	Duc.	L.
If 216 : 1 ::	385.625	
.216	385.625	
21	385.625	
		Duc.
195	347062.5	1779.8
195		Ans.
1520		
1365		
1556		
1365		
1912		
1755		
1575		
1560		
(15)		

Bank-money is reduced to current money, by allowing for the agio, as was done in exchange with Holland; viz. say, As 100 to 120, or as 10 to 12, or as 5 to 6, so the given bank-money to the current sought. And current money is reduced to bank-money by reversing the operation. And in like manner may picoli-money be reduced to current or to bank money, and the contrary.

100 ducats banco of Venice.

In Leghorn = 73 pezzos | In Lucca = 77 crowns
In Rome = 68½ crowns | In Francfort = 139½ florins.

VII. Exchange with Genoa.

MONEY-TABLE.

12 Denari } make { 1 foldi s. d.
20 Soldi } make { 1 pezzo = 4 6 Sterling.

Books and accounts are generally kept in pezzos, foldi, and denari; but some keep them in lires, foldi, and denari; and 12 such denari make 1 foldi, and 20 foldi make 1 lire.

The pezzo of exchange is equal to 5¼ lires; and, consequently, exchange-money is 5¼ times better than the lire money. The course of exchange runs from 47 d. to 58 d. Sterling per pezzo.

EXAMP. How much Sterling money is equivalent to 3390 pezzos 16 foldi of Genoa, exchange at 51¾ d. Sterling per pezzo?

Soldi.	d.	Pez.	foldi.
If 20 : 51¾ ::	3390	16	
8	—	20	
415			
160		67816	
		415	
		339080	
		67816	
		271264	
	d.	L.	s. d.
160	28143640	175897¾	= 732 18 1¼

If Sterling money be given, it may be reduced or changed into pezzos of Genoa, by reversing the former operation.

Exchange money is reduced to lire-money, by being multiplied by 5¼, as follows:

Pez.	foldi.	Decimally.
3390	16	3390.8
	5¼	5.75
16954	0	169540
1695	8	237356
847	14	169540

Lires 19497 2 Lires 19497.100

And lire-money is reduced to exchange-money by dividing it by 5¼.

In Milan, 1 crown = 80
In Naples, 1 ducat = 86
In Leghorn, 1 piafre = 20
In Sicily, 1 crown = 127½

VIII. Exchange with Leghorn.

MONEY-TABLE.

12 Denari } make { 1 foldi s. d.
20 Soldi } make { 1 piafre = 4 6 Ster.

Books and accounts are kept in piafres, foldi, and denari. The piafre here consists of 6 lires, and the lire contains 20 foldi, and the foldi 12 denari, and consequently exchange money is 6 times better than lire money. The course of exchange is from 47 d. to 58 d. Sterling per piafre.

EXAMPLE. What is the Sterling value of 731 piafres, at 55½ each?

s.	d.	731 piafres, at 55½ d.
4 or 48 = 1/7	146	4
6 = 1/8	18	5 6
1½ = 1/4	4	11 4½

L. 169 0 10½ Ans.

Sterling-money is reduced to money of Leghorn, by reversing the former operation; and exchange-money is reduced to lire-money by multiplying by 6, and lire-money to exchange-money by dividing by 6.

100 piafres of Leghorn are

In Naples = 134 ducats | In Geneva = 185½ crowns.

Soldi of Leghorn.

In Sicily, 1 crown = 133½

In Sardinia, 1 dollar = 95½

The above are the chief places in Europe with which Britain exchanges directly; the exchanges with other places are generally made by bills on Hamburg, Holland, or Venice. We shall here, however, subjoin the par of exchange betwixt Britain and most of the other places in Europe with which she has any commercial intercourse.

Par in Sterling L. s. d.

Rome,	1	crown	=	6	12½
Naples,	1	ducat	=	3	4½
Florence,	1	crown	=	5	4½
Milan,	1	ducat	=	4	7
Bologna,	1	dollar	=	4	3
Sicily,	1	crown	=	5	0
Vienna,	1	rixdollar	=	4	8
Augsburgh,	1	florin	=	3	1½
Francfort,	1	florin	=	3	0
Bremen,	1	rixdollar	=	3	6
Breslau,	1	rixdollar	=	3	3

Berlin,

Exchange.

Par in Sterling L. s. d.		
Berlin,	1 rixdollar	= 4 0
Stetin,	1 mark	= 1 6
Embsden,	1 rixdollar	= 3 6
Bolsenna,	1 rixdollar	= 3 8
Dantzic,	13½ florins	= 1 0 0
Stockholm,	34½ dollars	= 1 0 0
Russia,	1 ruble	= 4 5
Turkey,	1 asper	= 4 6

The following places, viz. Switzerland, Nurem-
burgh, Leipzig, Dresden, Olnaburgh, Brunfwic, Co-
logne, Leige, Strasburgh, Cracow, Denmark, Nor-
way, Riga, Revel, Narva, exchange with Britain,
when direct exchange is made, upon the rixdollar, the
par being 4 s. 6 d. Sterling.

IX. Exchange with America and the West Indies.

In North America and the West Indies, accounts,
as in Britain, are kept in pounds, shillings, and pence.
In North America they have few coins circulating a-
mong them, and on that account have been obliged to
substitute a paper-currency for a medium of their com-
merce; which having no intrinsic value, is subjected to
many disadvantages, and generally suffers a great dis-
count. In the West Indies coins are more frequent,
owing to their commercial intercourse with the Spa-
nish settlements.

Exchange betwixt Britain and America, or the West
Indies, may be computed as in the following examples :

1. The neat proceeds of a cargo from Britain to
Boston amount to 845 l. 17 s. 6 d. currency: How
much is that in Sterling money, exchange at 80 per
cent.?

$$\begin{array}{r} \text{If } 180 : 100 \\ 18 : 10 \quad L. \quad s. \quad d. \\ 9 : 5 :: 845 \quad 17 \quad 6 \\ \hline 5 \\ 9)4229 \quad 7 \quad 6 \end{array}$$

L. 469 18 7½ Ster. Ans.

2. Boston remits to Britain a bill of 469 l. 18 s.
7½ d. Sterling: How much currency was paid for the
bill at Boston, exchange at 80 per cent.?

$$\begin{array}{r} \text{If } 100 : 180 \quad L. \quad s. \quad d. \\ 5 : 9 :: 469 \quad 18 \quad 7\frac{1}{2} \\ \hline 9 \end{array}$$

$$5)4229 \quad 7 \quad 6$$

845 17 6 currency. Ans.

3. How much Sterling-money will 1780 l. Jamaica
currency amount to, exchange at 40 per cent.?

$$\begin{array}{r} \text{If } 140 : 100 \\ 14 : 10 \quad L. \\ 7 : 5 :: 1780 \\ \hline 5 \end{array}$$

$$7)8900$$

1271 8 6¼ Ster. Ans.

Bills of exchange from America, the rate being high,
is an expensive way of remitting money to Britain; and
therefore merchants in Britain generally choose to
have the debts due to them remitted home in sugar,
rum, or other produce.

Exchange.

X. Exchange with Ireland.

At Dublin, and all over Ireland, books and accounts
are kept in pounds, shillings, and pence, as in Britain;
and they exchange on the 100 l. Sterling.

The par of one shilling Sterling is one shilling and
one penny Irish; and so the par of 100 l. Sterling is
108 l. 6 s. 8 d. Irish. The course of exchange runs
from 6 to 15 per cent.

EXAMP. 1. London remits to Dublin 586 l. 10 s.
Sterling: How much Irish money will that amount to,
exchange at 9½ per cent.?

$$\begin{array}{r} L. \\ \text{If } 100 : 109\frac{1}{2} :: 586.5 \\ 8 \quad \quad \quad 877 \\ \hline 800 : 877 \quad 41055 \\ \quad \quad \quad 41055 \\ \quad \quad \quad 46920 \\ \hline 800)514360.5 \\ \quad \quad \quad 642.950625 \\ \text{Ans. } 642 \text{ l. } 19 \text{ s. Irish.} \end{array}$$

By practice.

	586.5
p. cent.	
10 = $\frac{1}{10}$	58.65
2 = $\frac{1}{5}$	11.73 sub.
8 =	46.92
1 = $\frac{1}{8}$	5.865
$\frac{4}{8}$ = $\frac{1}{2}$	2.9325
$\frac{1}{8}$ = $\frac{1}{4}$.733125
9½	56.450625 add.
	642.950625

2. How much Sterling will 625 l. Irish amount to,
exchange at 10½ per cent.?

$$\begin{array}{r} \text{If } 110\frac{1}{2} : 100 :: 625 \\ 8 \quad \quad \quad 800 \end{array}$$

$$\begin{array}{r} L. \quad s. \quad d. \\ 883 \quad 800 \quad 883)500000(566 \quad 5 \quad 0\frac{1}{4} \text{ Ster. Ans.} \end{array}$$

XI. Exchange betwixt London and other places in
Britain.

THE several towns in Britain exchange with Lon-
don for a small premium in favour of London; such
as, 1, 1¼, &c. per cent. The premium is more or less,
according to the demand for bills?

EXAMP. Edinburgh draws on London for 860 l. ex-
change at 1½ per cent.: How much money must be paid
at Edinburgh for the bill?

L.	860
per cent.	
1 = $\frac{1}{100}$	8 12
$\frac{1}{2}$ = $\frac{1}{200}$	2 3
$\frac{1}{4}$ = $\frac{1}{400}$	1 1 6
	11 16 6 premium.
	871 16 6 paid for the bill.

To

Exchange. To avoid paying the premium, it is an usual practice to take the bill payable at London a certain number of days after date; and in this way of doing, 73 days is equivalent to 1 *per cent.*

XII. Arbitration of Exchanges.

THE course of exchange betwixt nation and nation naturally rises or falls according as the circumstances and balance of trade happen to vary. Now, to draw upon and remit to foreign places, in this fluctuating state of exchange, in the way that will turn out most profitable, is the design of arbitration. Which is either simple or compound.

I. Simple Arbitration.

IN simple arbitration the rates or prices of exchange from one place to other two are given; whereby is found the correspondent price between the said two places, called the *arbitrated price*, or *par of arbitration*: and hence is derived a method of drawing and remitting to the best advantage.

EXAMP. 1. If exchange from London to Amsterdam be 33 s. 9 d. *per pound* Sterling; and if exchange from London to Paris be 32 d. *per crown*; what must be the rate of exchange from Amsterdam to Paris, in order to be put on a par with the other two?

Ster.	Flem.	Ster.
s.	s.	d.
If 20	: 33 9	:: 32
12	12	
<hr/>		
240	405	
	32	
<hr/>		
	810	
	1215	
<hr/>		

240) 12960 (54 d. Flem. *per crown.* *Ans.*

2. If exchange from Paris to London be 32 d. Sterling *per crown*; and if exchange from Paris to Amsterdam be 54 d. Flemish *per crown*; what must be the rate of exchange between London and Amsterdam, in order to be on a par with the other two?

Ster.	Flem.	Ster.
d.	d.	d.
If 32	: 54	:: 240
	240	
<hr/>		
	216	
	108	
<hr/>		

32) 12960 (405 (33 9 Flem. *per l. Ster.* *Ans.*

From these operations it appears, that if any sum of money be remitted, at the rates of exchange mentioned, from any one of the three places to the second, and from the second to the third, and again from the third to the first, the sum so remitted will come home entire, without increase or diminution.

From the par of arbitration thus found, and the course of exchange given, is deduced a method of drawing and remitting to advantage, as in the following example.

3. If exchange from London to Paris be 32 d. Sterling *per crown*, and to Amsterdam 405 d. Flemish *per pound* Sterling; and if, by advice from Holland to France, the course of exchange between Paris and Amsterdam is fallen to 52 d. Flemish *per crown*; what may be gained *per cent.* by drawing on Paris, and remitting to Amsterdam?

The par of arbitration between Paris and Amsterdam in this case, by Ex. 1. is 54 d. Flemish *per crown.* Work as under.

d. St.	Cr.	L. St.	Cr.
If 32	: 1	: 100	: 750 debit at Paris
Cr.	d. Fl.	C.	d. Fl.
If 1	: 52	: 750	: 39000 credit at Amsterdam.
d. Fl.	L. St.	d. Fl.	L. s. d. Ster.
If 405	: 1	: 39000	: 96 5 11½ to be remitted.
			100

3 14 0⁸/₉

But if the course of exchange between Paris and Amsterdam, instead of falling below, rise above the par of arbitration, suppose to 56 d. Flemish *per crown*; in this case, if you propose to gain by the negotiation, you must draw on Amsterdam, and remit to Paris. The computation follows.

L. St.	d. Fl.	L. St.	d. Fl.
If 1	: 405	: 100	: 40500 debit at Amsterdam.
d. Fl.	Cr.	d. F.	Cr.
If 56	: 1	: 40500	: 723 ³ / ₄ credit at Paris.
Cr.	d. St.	Cr.	L. s. d. Ster.
If 1	: 32	: 723 ³ / ₄	: 96 8 6½ to be remitted.
			100

3 11 5⁷/₈ gained *per cent.*

In negotiations of this sort, a sum for remittance is afforded out of the sum you receive for the draught; and your credit at the one foreign place pays your debt at the other.

II. Compound Arbitration.

IN compound arbitration the rate or price of exchange between three, four, or more places, is given, in order to find how much a remittance passing through them all will amount to at the last place; or to find the arbitrated price, or par of arbitration, between the first place and the last. And this may be done by the following

RULES. I. Distinguish the given rates or prices into antecedents and consequents; place the antecedents in one column, and the consequents in another on the right, fronting one another by way of equation.

II. The first antecedent, and the last consequent to which an antecedent is required, must always be of the same kind.

III. The second antecedent must be of the same kind with the first consequent, and the third antecedent of the same kind with the second consequent, &c.

IV. If to any of the numbers a fraction be annexed, both the antecedent and its consequent must be multiplied into the denominator.

V. To facilitate the operation, terms that happen to be equal or the same in both columns, may be dropped or rejected, and other terms may be abridged.

VI.

Exchange.

VI. Multiply the antecedents continually for a divisor, and the consequents continually for a dividend, and the quot will be the answer or antecedent required.

EXAMP. 1. If London remit 1000 l. Sterling to Spain, by way of Holland, at 35 s. Flemish per pound Sterling; thence to France, at 58 d. Flemish per crown; thence to Venice, at 100 crowns per 60 ducats; and thence to Spain, at 360 mervadies per ducat; how many piaftres, of 272 mervadies, will the 1000 l. Sterling amount to in Spain?

Antecedents.	Consequents.	Abridged.
1 l. Sterling	= 35 s. or 420 d. Fl.	1 = 210
58 d. Flemish	= 1 crown France	29 = 1
100 crowns France	= 60 ducats Venice	1 = 30
1 ducat Venice	= 360 mervadies Spain	1 = 45
272 mervadies	= 1 piaftre	17 = 1
How many piaftres	= 1000 l. Sterling	= 10

In order to abridge the terms, divide 58 and 420 by 2, and you have the new antecedent 29, and the new consequent 210; reject two ciphers in 100 and 1000; divide 272 and 360 by 8, and you have 34 and 45; divide 34 and 60 by 2, and you have 17 and 30; and the whole will stand abridged as above.

Then, $29 \times 17 = 493$ divisor; and $210 \times 30 \times 45 \times 10 = 2835000$ dividend; and, $493 \overline{) 2835000} (5750 \frac{1}{2}$ piaftres. *Ans.*

Or, the consequents may be connected with the sign of multiplication, and placed over a line by way of numerator; and the antecedents, connected in the same manner, may be placed under the line, by way of denominator; and then abridged, as follows:

$$\frac{420 \times 60 \times 360 \times 100}{58 \times 100 \times 272} = \frac{210 \times 60 \times 160 \times 10}{29 \times 272}$$

$$= \frac{210 \times 60 \times 45 \times 10}{29 \times 34} = \frac{210 \times 30 \times 5 \times 10}{29 \times 17}$$

$$= \frac{2835000}{493}$$

And, $493 \overline{) 2835000} (5750 \frac{1}{2}$ piaftres. *Ans.*

The placing the terms by way of antecedent and consequent, and working as the rules direct, save so many flatings of the rule of three, and greatly shortens the operation. The proportions at large for the above question would stand as under.

L. St.	d. Fl.	L. St.	d. Fl.
If 1	: 420 ::	1000	: 420000
d. Fl.	Cr.	d. Fl.	Cr.
If 58	: 1 ::	420000	: 7241 $\frac{1}{2}$
Cr.	Duc.	Cr.	Duc.
If 100	: 60 ::	7241 $\frac{1}{2}$: 4344 $\frac{2}{3}$
Duc.	Mer.	Duc.	Mer.
If 1	: 360 ::	4344 $\frac{2}{3}$: 1564137 $\frac{7}{9}$
Mer.	Piaft.	Mer.	Piaft.
If 272	: 1 ::	1564137 $\frac{7}{9}$: 5750 $\frac{1}{2}$

If we suppose the course of direct exchange to Spain to be 42 $\frac{1}{2}$ d. Sterling per piaftre, the 1000 l. remitted would only amount to 5647 $\frac{1}{2}$ piaftres; and, consequently, 103 piaftres are gained by the negotiation; that is, about 2 per cent.

2. A banker in Amsterdam remits to London 400 l. Flemish; first to France at 56 d. Flemish per crown; from France to Venice, at 100 crowns per 60 ducats;

from Venice to Hamburg, at 100 d. Flemish per ducat. Exchange. from Hamburg to Lisbon, at 50 d. Flemish per crusade of 400 rees; and, lastly, from Lisbon to London at 64 d. Sterling per millree: How much Sterling money will the remittance amount to? and how much will be gained or saved, supposing the direct exchange from Holland to London at 36 s. 10 d. Flemish per pound Sterling?

Antecedents.	Consequents.
56 d. Flem.	= 1 crown
100 crowns	= 60 ducats.
1 ducat	= 100 d. Flem.
50 d. Flem.	= 400 rees.
1000 rees	= 64 d. Sterling.

How many d. Ster. = 400 l. or 96000 d. Flemish?

This, in the fractional form, will stand as follows.

$$\frac{60 \times 100 \times 400 \times 64 \times 96000}{65 \times 100 \times 50 \times 1000} = \frac{368640}{7}$$

7) 368640 (52662 $\frac{6}{7}$ d. Ster. = 219 l. 8 s. 6 $\frac{6}{7}$ d. St. *Ans.*

To find how much the exchange from Amsterdam directly to London, at 36 s. 10 d. Flemish per l. Sterling, will amount to, say,

s. d.	d. Fl.	L. St.	d. Fl.	L. St.	s. d. St.
36	10	If 442	: ::	96000	: 217 3 10 $\frac{1}{2}$
12					219 8 6 $\frac{1}{4}$

442 Gained or saved, 2 4 8 $\frac{1}{2}$

In the above example, the par of arbitration, or the arbitrated price, between London and Amsterdam, viz. the number of Flemish pence given for 1 l. Sterling, may be found thus:

Make 64 d. Sterling, the price of the millree, the first antecedent; then all the former consequents will become antecedents, and all the antecedents will become consequents. Place 240, the pence in 1 l. Sterling, as the last consequent, and then proceed as taught above, viz.

Antecedents.	Consequents.
64 d. Ster.	= 1000 rees.
400 rees	= 50 d. Flem.
100 d. Flem.	= 1 ducat.
60 ducats	= 100 crowns.
1 crown	= 56 d. Flem.
How many d. Flem.	= 240 d. Ster.?

$$\frac{1000 \times 50 \times 100 \times 56 \times 240}{64 \times 400 \times 100 \times 60} = \frac{875}{2}$$

2) 875 (437 $\frac{1}{2}$ d. = 36 s. 5 $\frac{1}{2}$ d. Flem. per l. Ster. *Ans.*

Or the arbitrated price may be found from the answer to the question, by saying

d. Ster.	d. Flem.	d. St.
If 368640	: 96000 ::	240

$$\frac{368640}{96000} = \frac{240}{x}$$

$$x = \frac{240 \times 96000}{368640} = 62$$

$$62 \times 100 = 6200$$

$$6200 - 240 = 6288$$

$$6288 - 1344 = 4944$$

d. s. d. Flem.
368640) 161280000 (437 $\frac{1}{2}$ = 36 5 $\frac{1}{2}$ as before.

The work may be proved by the arbitrated price thus: As 1 l. Sterling to 36 s. 5 $\frac{1}{2}$ d. Flemish, so 219 l. 8 s. 6 $\frac{6}{7}$ d. Sterling to 400 l. Flemish.

The

Exchange,
Exchequer.

The arbitrated price compared with the direct course shows whether the direct or circular remittance will be most advantageous, and how much. Thus the banker at Amsterdam will think it better exchange to receive 11. Sterling for 36s 5½d. Flemish, than for 36s. 10d. Flemish.

EXCHANGE signifies also a place in most considerable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other persons concerned in commerce, meet on certain days, and at certain times thereof, to confer and treat together of matters relating to exchanges, remittances, payments, adventures, assurances, freightments, and other mercantile negociations, both by sea and land.

In Flanders, Holland, and several cities of France, these places are called *burfes*; at Paris and Lyons, *places de change*; and in the Hanse towns, *colleges of merchants*. These assemblies are held with so much exactness, and merchants and negociants are so indispensably required to attend at them, that a person's absence alone makes him be suspected of a failure or bankruptcy. The most considerable exchanges in Europe, are that of Amsterdam; and that of London, called the *Royal Exchange*.

Even in the time of the ancient Romans, there were places for the merchants to meet, in most of the considerable cities of the empire. That said by some to have been built at Rome in the year of the city 259, 493 years before our Saviour, under the consulate of Appius Claudius and Publius Servilius, was called *collegium mercatorum*; whereof it is pretended there are still some remains, called by the modern Romans *loggia*, the lodge; and now, usually, the Place of St George. This notion of a Roman exchange is supposed to be founded on the authority of Livy, whose words are as follow; viz. *Certamen consulibus inciderat, uter dedicaret Mercurii aedem. Senatus a se rem ad populum rejecit: utri eorum dedicatio jussu populi data esset, cum praesse annonae, mercatorium collegium instituere jussit.* Liv. lib. ii. But it must be here remarked, that *collegium* never signified a building for a society in the purer ages of the Latin tongue; so that *collegium mercatorum instituere* must not be rendered to build an exchange for the merchants, but to incorporate the merchants into a company. As Mercury was the God of traffick, this *aedes Mercuri* seems to have been chiefly designed for the devotions of this company or corporation.

EXCHEQUER, in the British jurisprudence, an ancient court of record, in which all causes concerning the revenues and rights of the crown are heard and determined, and where the crown revenues are received. It took this name from the cloth that covered the table of the court, which was party-coloured, or chequered.

This court is said to have been erected by William the Conqueror, its model being taken from a like court established in Normandy long before that time. Anciently its authority was so great, that it was held in the king's palace, and the acts thereof were not to be examined or controlled in any other of the king's courts; but, at present, it is the last of the four courts at Westminster.

In the exchequer, some reckon seven courts, viz. those of pleas, accounts, receipts, exchequer-chamber (which is an assembly of all the judges on difficult mat-

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ters in law), errors in the exchequer, errors in the king's bench, and, lastly, the court of equity in the exchequer.

But the exchequer, for the dispatch of business, is generally divided into two parts; one of which is chiefly conversant in the judicial hearing and deciding of all causes relating to the king's coffers, formerly termed the *exchequer of accounts*: the other is called the *receipt of the exchequer*, as being principally employed in receiving and paying of money.

Officers of the receipt may take one penny in the pound, as their fee for sums issued out; and they are obliged, without delay, to receive the money brought thither; and the money received is to be put into chests under three different locks and keys, kept by three several officers. All sheriffs, bailiffs, &c. are to account in the exchequer; and in the lower part, termed the receipt, the debtors of the king, and persons in debt to them, the king's tenants, and the officers and ministers of the court, are privileged to sue one another, or any stranger, and to be sued in the like actions as are brought in the courts of king's bench and common-pleas.

The judicial part of the exchequer, is a court both of law and equity. The court of law is held in the office of pleas, according to the course of common law, before the barons: in this court, the plaintiff ought to be a debtor or accountant to the king; and the leading process is either a writ of subpoena, or *quominus*, which last goes into Wales, where no process out of courts of law ought to run, except a *capias utlagatum*.

The court of equity is held in the exchequer chamber before the treasurer, chancellor, and barons; but, generally, before the barons only: the lord chief baron being the chief judge to hear and determine all causes. The proceedings in this part of the exchequer are by English bill and answer, according to the practice of the court of chancery; with this difference, that the plaintiff here must set forth, that he is a debtor to the king, whether he be so or not. It is in this court of equity that the clergy exhibit bills for the recovery of their tithes, &c. Here too the attorney-general exhibits bills for any matters concerning the crown; and a bill may be exhibited against the king's attorney by any person aggrieved in any cause prosecuted against him on behalf of the king, to be relieved therein: in which case, the plaintiff is to attend on the attorney-general, with a copy of the bill, and procure him to give in an answer thereto; in the making of which he may call in any person interested in the cause, or any officer, or others, to instruct him, that the king be not prejudiced thereby, and his answer is to be put in without oath.

But, besides the business relating to debtors, farmers, receivers, accountants, &c. all penal punishments, intrusion, and forfeitures upon popular actions, are matters likewise cognizable by this court; where there also sits a *justice*-baron, who administers the oaths to high sheriffs, bailiffs, auditors, receivers, collectors, comptrollers, surveyors, and searchers of all the customs, &c.

The exchequer in Scotland has the same privileges and jurisdiction as that of England; and all matters competent to the one are likewise competent to the other.

Black

Exchequer,
Excise.

Black Book of the EXCHEQUER, is a book under the keeping of the two chamberlains of the exchequer; said to have been composed in 1175 by Gervais of Tilbury, nephew of king Henry II. and divided into several chapters. Herein is contained a description of the court of England, as it then stood, its officers, their ranks, privileges, wages, perquisites, power, and jurisdiction; and the revenues of the crown, both in money, grain, and cattle. Here we find, that for one shilling, as much bread might be bought as would serve 100 men a whole day; that the price of a fat bullock was only 12 shillings, and a sheep four, &c.

Chancellor of the EXCHEQUER. See CHANCELLOR.

EXCHEQUER-Bills. By statute 5 Ann c. 13. the lord-treasurers may cause exchequer-bills to be made of any sums not exceeding 1,500,000 l. for the use of the war; and the duties upon houses were made chargeable with 4 l. 10 s. *per cent. per annum* to the bank for circulating them. The bank not paying the bills, actions to be brought against the company, and the money and damages recovered: and if any exchequer-bills be lost, upon affidavit of it before a baron of the exchequer, and certificate from such baron, and security to pay the same if found, duplicates are to be made out: also when bills are defaced, new ones shall be delivered. The king; or his officers in the exchequer, by former statutes, might borrow money upon the credit of bills, payable on demand, with interest after the rate of 3 d. *per diem* for every 100 l. bill. And by 8 & 9 W. 3. c. 20. an interest of 5 d. a-day was allowed for every 100 l. But 12 W. 3. c. 1. lowered the interest on these bills to 4 d. a-day *per cent.* And by 12 Ann. c. 11. it is sunk to 2 d. a-day.—Forging exchequer bills, or the indorsements thereof, is felony.

EXCISE, (from the Belgic *accisse*, tributum, "tribute"), an inland duty or imposition, paid sometimes upon the consumption of the commodity, or frequently upon the wholesale, which is the last stage before the consumption. This is doubtless, impartially speaking, the most economical way of taxing the subject; the charges of levying, collecting, and managing the excise-duties, being considerably less in proportion than in other branches of the revenue. It also renders the commodity cheaper to the consumer, than charging it with customs to the same amount would do; for the reason just now given, because generally paid in a much later stage of it. But, at the same time, the rigour and arbitrary proceedings of excise-laws seem hardly compatible with the temper of a free nation. For the frauds that might be committed in this branch of the revenue, unless a strict watch is kept, make it necessary, wherever it is established, to give the officers a power of entering and searching the houses of such as deal in exciseable commodities, at any hour of the day, and, in many cases, of the night likewise. And the proceedings, in case of transgressions, are so summary and sudden, that a man may be convicted in two days time in the penalty of many thousand pounds, by two commissioners or justices of the peace; to the total exclusion of the trial by jury, and disregard of the common law. For which reason, tho' lord Clarendon tells us, that to his knowledge the earl of Bedford (who was made lord treasurer by king Charles I. to oblige his parliament) intended to have set up the excise in England, yet it never made a part

Excise.

of that unfortunate prince's revenue; being first introduced, on the model of the Dutch prototype, by the parliament itself after its rupture with the crown. Yet such was the opinion of its general unpopularity, that when in 1642 "aspersions were cast by malignant persons upon the house of commons, that they intended to introduce excises, the house for its vindication therein did declare, that these rumours were false and scandalous, and that their authors should be apprehended and brought to condign punishment." Its original establishment was in 1643, and its progress was gradual; being at first laid upon those persons and commodities where it was supposed the hardship would be least perceivable, viz. the makers and venders of beer, ale, cyder, and perry; and the royalists at Oxford soon followed the example of their brethren at Westminster, by imposing a similar duty: both sides protesting, that it should be continued no longer than to the end of the war, and then be utterly abolished. But the parliament at Westminster soon after imposed it on flesh, wine, tobacco, sugar, and such a multitude of other commodities, that it might be fairly denominated *general*: in pursuance of the plan laid down by Mr Pymme (who seems to have been the father of the excise), in his letter to Sir John Hotham, signifying, "that they had proceeded in the excise to many particulars, and intended to go on farther; but that it would be necessary to use the people to it by little and little." And afterwards, when the nation had been accustomed to it for a series of years, the succeeding champions of liberty boldly and openly declared "the impost of excise to be the most easy and indifferent levy that could be laid upon the people;" and accordingly continued it during the whole usurpation. Upon king Charles's return, it having then been long established and its produce well known, some part of it was given to the crown, in 12 Car. II. by way of purchase for the feudal tenures and other oppressive parts of the hereditary revenue. But, from its first original to the present time, its very name has been odious to the people. It has, nevertheless, been imposed on abundance of other commodities in the reigns of king William III. and every succeeding prince, to support the enormous expences occasioned by our wars on the continent. Thus brandies and other spirits are now excised at the distillery; printed silks and linens, at the printer's; starch and hair powder, at the maker's; gold and silver wire, at the wiredrawer's; all plate whatsoever, first in the hands of the vender, who pays yearly for a licence to sell it, and afterwards in the hands of the occupier, who also pays an annual duty for having it in his custody; and coaches and other wheel-carriages, for which the occupier is excised; tho' not with the same circumstances of arbitrary strictness with regard to plate and coaches as in the other instances. To these we may add coffee and tea, chocolate and cocoa paste, for which the duty is paid by the retailer; all artificial wines, commonly called *sweets*; paper and pasteboard, first when made, and again if stained or printed; malt, as before-mentioned; vinegars; and the manufacture of glass; for all which the duty is paid by the manufacturer; hops, for which the person that gathers them is answerable; candles and soap, which are paid for at the maker's; malt liquors brewed for sale, which are excised at the brewery; cyder and perry at the ven-

H

der's;

Blackst.
Comment.

Excision der's; leather and skins, at the tanner's; and, lately, tobacco, at the manufacturer's: A list, which no friend to his country would wish to see farther increased.

Excoecaria.

The excise was formerly farmed out; but is now managed for the king by commissioners in both kingdoms, who receive the whole product of the excise, and pay it into the exchequer. These commissioners are nine in number in England, and five in Scotland. The former have a salary of 1000 l. a-year, the latter 600 l. They are obliged by oath to take no fee or reward but from the king himself; and from them there lies an appeal to five other commissioners called *commissioners of appeals*.

EXCISION, in surgery, the cutting out, or cutting off, any part of the body.

EXCISION, in a scripture sense, means the cutting off of a person from his people, by way of punishment for some sin by him committed. The Jews, Selden informs us, reckon up 36 crimes, to which they pretend this punishment is due. The Rabbins reckon three kinds of excision; one, which destroys only the body; another, which destroys the soul only; and a third, which destroys both body and soul. The first kind of excision they pretend is an untimely death; the second is an utter extinction of the soul; and the third, a compound of the two former: thus, making the soul mortal or immortal, says Selden, according to the degrees of misbehaviour and wickedness of the people.

EXCLAMATION. See ORATORY, n° 85.

EXCLUSION, or *Bill of Exclusion*, a bill proposed about the close of the reign of king Charles II. for excluding the duke of York, the king's brother, from the throne, on account of his being a Papist.

EXCLUSIVE, is sometimes used adjectively, thus; *A patent carries with it an exclusive privilege*. Sometimes adverbially: as, *He sent him all the numbers from n° 145 to n° 247 exclusive*; that is, all between these two numbers, which themselves were excepted.

EXCOECARIA, in botany: A genus of the triandria order, belonging to the dioecia class of plants; and in the natural method ranking under the 38th order, *Tricocca*. The male amentum is naked; there is no calyx nor corolla; there are three styles, and a tricoëous capsule. There is but one species, the agallocha, or aloes-wood, a native of China and some of the Indian islands, is about the same height and form as the olive tree. Its trunk is of three colours, and contains three sorts of wood: the heart is that of tambac or calombac, which is dearer in the Indies than even gold itself. It serves to perfume cloaths and apartments; and is esteemed a sovereign cordial in fainting fits, a restorative in the palsy, and a cure for ascariæ in children. It is burnt as incense in the Chinese and Indian temples; and it's also used to set the most precious jewels that are worked in the Indies.

The aloes-wood is very highly valued; and strange fables were invented as to the origin of the tree that yields it; some pretending that it grew in Paradise, and was only conveyed to us by means of the rivers overflowing their banks and sweeping off the trees in their way; others affirming that it grew on inaccessible mountains, where it was guarded by certain wild beasts, &c. The Siamese ambassadors to the court of France in 1686, who brought a present of this wood from

their emperor, first gave the Europeans any consistent account of it. See *Xylo-Aloes*.

Excommunication.

EXCOMMUNICATION, an ecclesiastical penalty or censure, whereby such persons as are guilty of any notorious crime or offence, are separated from the communion of the church, and deprived of all spiritual advantages.

Excommunication is founded on a natural right which all societies have, of excluding out of their body such as violate the laws thereof; and it was originally instituted for preserving the purity of the church; but ambitious ecclesiastics converted it by degrees into an engine for promoting their own power, and inflicted it on the most frivolous occasions.

The power of excommunication, as well as other acts of ecclesiastical discipline, was lodged in the hands of the clergy, who distinguished it into the *greater* and *lesser*. The lesser excommunication, simply called *apborismos*, "separation or suspension", consisted in excluding men from the participation of the eucharist, and the prayers of the faithful. But they were not expelled the church; for they had the privilege of being present at the reading of the Scriptures, the sermons, and the prayers of the catechumens and penitents. This excommunication was inflicted for lesser crimes; such as neglecting to attend the service of the church, misbehaviour in it, and the like.

The greater excommunication, called *panteles apborismos*, "total separation and anathema", consisted in an absolute and entire exclusion from the church and the participation of all its rites. When any person was thus excommunicated, notice was given of it by circular letters to the most eminent churches all over the world, that they might all confirm this act of discipline, by refusing to admit the delinquent to their communion. The consequences of this latter excommunication were very terrible. The excommunicated person was avoided in civil commerce and outward conversation. No one was to receive him into his house, nor eat at the same table with him; and when dead, he was denied the solemn rites of burial.

The Romish pontifical takes notice of three kinds of excommunication, 1. The minor, incurred by those who have any correspondence with an excommunicated person. 2. The major, which falls upon those who disobey the commands of the holy see, or refuse to submit to certain points of discipline; in consequence of which they are excluded from the church militant and triumphant, and delivered over to the devil and his angels. 3. Anathema, which is properly that pronounced by the pope against heretical princes and countries. In former ages, these papal fulminations were most terrible things; but at present, they are formidable to none but a few petty states of Italy.

Excommunication, in the Greek church, cuts off the offender from all communion with the 318 fathers of the first council of Nice, and with the saints; consigns him over to the devil and the traitor Judas; and condemns his body to remain after death as hard as a flint or piece of steel, unless he humbles himself and makes atonement for his sins by a sincere repentance. The form abounds with dreadful imprecations; and the Greeks assert, that if a person dies excommunicated, the devil enters into the lifeless corpse; and therefore, in order to prevent it, the relations of the deceased cut

his

Excommu-
nication.

his body in pieces, and boil them in wine. It is a custom for the patriarch of Jerusalem annually to excommunicate the pope and the church of Rome; on which occasion, together with a great deal of idle ceremony, he drives a nail into the ground with a hammer, as a mark of malediction.

The form of excommunication in the church of England anciently ran thus: "By the authority of God the Father Almighty, the Son and Holy Ghost, and of Mary the blessed mother of God, we excommunicate, anathematize, and sequester from the pale of holy mother church, &c." The causes of excommunication in England are, contempt of the bishop's court, herefy, neglect of public worship and the sacraments, incontinency, adultery, simony, &c. It is described to be twofold. The less is an ecclesiastical censure, excluding the party from the participation of the sacraments: the greater proceeds farther, and excludes him not only from these, but from the company of all Christians. But if the judge of any spiritual court excommunicates a man for a cause of which he hath not the legal cognizance, the party may have an action against him at common law, and he is also liable to be indicted at the suit of the king.

Heavy as the penalty of excommunication is, considered in a serious light, there are, notwithstanding, many obstinate or profligate men, who would despise the *brutum fulmen* of mere ecclesiastical censures, especially when pronounced by a petty surrogate in the country, for railing or contumelious words, for non-payment of fees or costs, or other trivial cause. The common law, therefore, compassionately steps in to their aid, and kindly lends a supporting hand to an otherwise tottering authority. Imitating herein the policy of the ancient Britons, among whom, according to Cæsar, whoever were interdicted by the druids from their sacrifices, "*In numero impiorum ac sceleratorum habentur: ab iis omnes decedunt, aditum eorum sermonemque defugiunt, ne quid ex contagione incommodi accipiant: neque iis petentibus jus redditur, neque honos ullus communicatur.*" And so with us, by the common law, an excommunicated person is disabled to do any act that is required to be done by one that is *probus et legalis homo*. He cannot serve upon juries; cannot be a witness in any court; and, which is the worst of all, cannot bring an action, either real or personal, to recover lands or money due to him. Nor is this the whole: for if, within 40 days after the sentence has been published in the church, the offender does not submit and abide by the sentence of the spiritual court, the bishop may certify such contempt to the king in chancery. Upon which there issues out a writ to the sheriff of the county, called from the bishop's certificate a *significavit*; or from its effect, a writ *de excommunicato capiendo*: and the sheriff shall thereupon take the offender and imprison him in the county jail, till he is reconciled to the church, and such reconciliation certified by the bishop; upon which another writ *de excommunicato deliberando*, issues out of chancery to deliver and release him.

EXCOMMUNICATION was also practised among the Jews, who used to expel from their synagogue such as had committed any grievous crime. See the Gospel according to St John, ix. 22. xii. 42. xvi. 2. And Joseph. Antiq. Jud. lib. ix. cap. 22. and lib. xvi. cap. 2.

Godwyn, in his *Moses and Aaron*, distinguishes three degrees, or kinds, of excommunication among the Jews. The first he finds intimated in John ix. 22. The second in 1 Cor. v. 5. And the third in 1 Cor. xvi. 22. See NIDDUI.

The rule of the Benedictines gives the name *excommunication* to the being excluded from the oratory, and the common table of the house, in our inns of court called *discommuning*. This was the punishment of such monks as came too late.

EXCOMMUNICATION, or a being secluded from a participation in the mysteries of religion, was also in use under paganism.

Such as were thus excommunicated were forbidden to assist or attend at the sacrifices, or to enter within the temples; and were afterwards delivered over to the demons and furies of hell, with certain imprecations; which was called among the Romans *diris devovere*. See EXECRATION.

The Druids among the ancient Britons and Gauls, likewise, made use of excommunication against rebels; and interdicted the communion of their mysteries to such as refused to acquiesce in their decisions. See DRUIDS.

EXCORIATION, in medicine and surgery, the galling, or rubbing off of the cuticle, especially of the parts between the thighs and about the anus. In adults, it is occasioned by riding, much walking, or other vehement exercise, and may be cured by vulnerary applications. In children there is often an excoriation, not only of the parts near the pudenda, chiefly of the groin and scrotum, but likewise in the wrinkles of the neck, under the arms, and in other places; proceeding from the acrimony of urine and sweat; and occasioning itching pains, crying, watching, restlessness, &c. To remedy this, the parts affected may be often washed with warm water, and sprinkled with drying powders, as chalk, hartshorn, but especially tutty, lapis calaminaris, and cerufs, which may be tied loosely in a rag, and the powder shook out on the parts.

EXCREMENT, whatever is discharged out of the body of animals after digestion; or the fibrous part of the aliment, mixed with the bile, saliva, and other fluids. Urine and the feces are the gross excrements that are discharged out of the bladder or belly. Other excrements are the various humours that are secreted from the blood through the different strainers in the body, and which serve for several uses; such as the saliva, sweat, bile, the pancreatic juice, lymph, the semen, nails, the hair, the horns and hoofs of animals.

Alchemists, who have sought every where for their *great work*, as they called it, have particularly operated much on the excrements of men and other animals; but philosophical chemistry has acquired no knowledge from all these alchemical labours, from the obscurity with which their authors have described them. The philosophic chemists have not much examined animal excrements. Of these, Homberg is the only one who has particularly analysed and examined human ordure; and this was done to satisfy an alchemical project of one of his friends, who pretended that from this matter a white oil could be obtained, without smell, and capable of fixing mercury into silver. The oil was found by Homberg, but mercury was not fixed by it.

Excommu-
nication
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Excrement.

Excrecence

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Excubie.

• See Putrefaction.

The labours of this able chemist were not, however, useless, like those of the alchemists; because he has clearly related the experiments he made on this matter, in the Memoirs of the Academy of Sciences. These experiments are curious, and teach several essential things concerning the nature of excrements. The result of these experiments is as follows: Fresh human feces, being distilled to dryness in a water bath, furnish a clear, watery, insipid liquor, of a disagreeable smell, but which contains no volatile alkali; which is a proof that this matter, although nearly in a putrefactive state, is not however putrefied; for all substances really putrid furnish with this degree of heat a manifest volatile alkali*. The dry residuum of the foregoing experiment, being distilled in a retort with a graduated fire, furnishes a volatile alkaline spirit and salt, a fetid oil, and leaves a residuous coal. These are the same substances which are obtained from all animal matters.

Human feces, diluted and lixiviated in water, furnish by filtration and evaporation of the water an oily salt of a nitrous nature, which deflagrates like nitre upon ardent coals, and which inflames in close vessels when heated to a certain degree. This same matter yielded to Homberg, who treated it by a complete fermentation or putrefaction, excited by a digestion during 40 days in a gentle water-bath heat, and who afterwards distilled it, an oil without colour, and without bad smell, and such as he endeavoured to find; but which did not, as we said before, fix mercury into silver.

EXCRESCENCE, in surgery, denotes every preternatural tumour which arises upon the skin, either in the form of a wart or tubercle. If they are born with a person, as they frequently are, they are called *nevi materni*, or marks from the mother; but if the tumour is large, so as to depend from the skin, like a fleshy mass, it is then called a *sarcoma*. See SURGERY.

EXCRETION, or SECRETION, in medicine, a separation of some fluid, mixed with the blood, by means of the glands. Excretions, by which we mean those that evacuate superfluous and heterogeneous humours, purify the mass of blood: the humours which are generated in the blood are excreted by the glands, and are replaced by a sufficient quantity of aliment.

EXCRETORY, in anatomy, a term applied to certain little ducts or vessels, destined for the reception of a fluid, secreted in certain glandules, and other viscera, for the excretion of it in the appropriated places.

EXCUBIÆ, in antiquity, the watches and guards kept in the day by the Roman soldiers. They are contradistinguished from the *vigilie* which were kept in the night. The *excubie* were placed either at the gates and entrenchments or in the camp; for the latter there was allowed a whole *manipulus* to attend before the *prætorium*, and four soldiers to the tent of every *tribune*. The *excubie* at the gates of the camp, and at the entrenchments, were properly called *stationes*. One company of foot and one troop of horse were assigned to each of the four gates every day. To desert their post, or abandon their corps of guards, was an unpardonable crime.

The *triaris*, as the most honourable order of soldiers,

were excused from the ordinary watches; yet being placed opposite to the *equites*, they were obliged to have an eye over them.

LETTERS of EXCULPATION, in Scots law, a writ or summons issued by authority of the court of justiciary, at the instance of a pannel, for citing witnesses to prove his defences, or his objections to any of the jury or witnesses cited against him.

EXCUSATI, in church history, a term used to denote slaves, who flying to any church for sanctuary, were excused and pardoned by their masters; but these were obliged to take an oath to that purpose before they could have them again; and, if they broke the oath, they were punished and fined as persons guilty of perjury.

EXEAT, in church-discipline, a Latin term, used for a permission which a bishop grants a priest to go out of his diocese; or an abbot to a religious to go out of his monastery.

The word is also used in several great schools for leave given a scholar or student to go out. His master has given him an exeat.

EXECRATION, in antiquity, a kind of punishment, consisting of direful curses and marks of infamy: such was that used against Philip king of Macedon by the Athenians. A general assembly of the people being called, they made a decree, that all the statues and images of that king, and of all his ancestors, should be demolished, and their very name razed; that all the festivals, sacred rites, priests, and whatever else had been instituted in honour of him, should be profaned; that the very places where there had been any monument or inscription to his honour, should be detestable; that nothing should be set up, or dedicated in them, which could be done in clean places; and, lastly, that the priests, as often as they prayed for the Athenian people, allies, armies, and fleets, should as many times detest and execrate Philip, his children, kingdom, land and sea forces, and the whole race and name of the Macedonians.

At the taking and demolishing of cities, it was usual amongst the Jews, Greeks, and Romans, to pronounce curses upon, and load with direful execrations, the rebuilders of them.

EXECUTION, in a general sense, the act of accomplishing, finishing, or achieving any thing.

EXECUTION, in law, the completing or finishing some act, as of judgment, deed, &c. and it usually signifies the obtaining possession of any thing recovered by judgment of law.

Sir Edward Coke observes, that there are two sorts of executions: the one final; and the other a *quousque*, that tends to an end. An execution final, is that which makes money of the defendant's goods; or extends to his lands, and delivers them to the plaintiff, who accepts the same in satisfaction; and this is the end of the suit, and the whole that the king's writ requires to be done. The writ of execution with a *quousque*, tho' it tends to an end, yet is not final, as in the case of a *capias ad satisfac.* where the defendant's body is to be taken, in order that the plaintiff may be satisfied for his debt. See *CAPIAS*.

Executions are either in personal, real, or mixed actions. In a personal action, the execution may be made three

Exculpa-
tion
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Execution.

Execution.

three ways, viz. by the writ of *capias ad satisfaciendum*, against the body of the defendant; *feri facias*, against his goods; or *elegit*, against his lands. See *Fieri Facias* and *ELEGIT*.

See Ha-
ere.

In a real and mixed action, the execution is by writ of *habere facias possessionem*, and *habere possessionem*.* Writs of execution bind the property of goods only from the time of delivery of the writ to the sheriff; but the land is bound from the day of the judgment obtained: and here the sale of any goods for valuable consideration, after a judgment, and before the execution awarded, will be good. It is otherwise as to lands, of which execution may be made, even on a purchase after the judgment, though the defendant sell such land before execution. Likewise, sheriffs may deliver in execution all the lands whereof others shall be seised in trust for him, against whom execution is had on a judgment, &c.

When any judgment is signed, the execution may be taken out immediately thereon; but if it be not issued within a year and a day after, where there is no fault in the defendant, as in the case of an injunction, writ of error, &c. there must be a *seire facias*, to revive the judgment; though, if the plaintiff sues out any writ of execution within the year, he may continue it after the year is expired. After judgment against the defendant, in an action wherein special bail is given, the plaintiff is at liberty to have execution against such defendant, or against his bail: but this is understood where the defendant does not render himself, according to law, in safeguard of the bail: and execution may not regularly be sued forth against a bail, till a default is returned against the principal: also if the plaintiff takes the bail, he shall never take the principal. It is held that an execution may be executed after the death of the defendant: for his executor, being privy thereto, is liable as well as the testator. The executor is an entire thing, so that he who begins must end it: therefore, a new sheriff may distrain an old one, to sell the goods seized on a distringas, and to bring the money into court.

† See Judge-
ment.

EXECUTION, in criminal cases, the completion of human punishment. This follows judgment†; and must in all cases, capital as well as otherwise, be performed by the legal officer, the sheriff or his deputy; whose warrant for so doing was anciently by precept under the hand and seal of the judge, as it is still practised in the court of the lord high steward, upon the execution of a peer: though, in the court of the peers in parliament, it is done by writ from the king. Afterwards it was established, that in case of life, the judge may command execution to be done without any writ. And now the usage is, for the judge to sign the kalendar or list of all the prisoners names, with their separate judgments in the margin, which is left with the sheriff. As, for a capital felony, it is written opposite to the prisoner's name, "let him be hanged by the neck;" formerly, in the days of Latin and abbreviation, "*sus. per coll.*" for "*suspendatur per collum.*" And this is the only warrant that the sheriff has for so material an act as taking away the life of another. It may certainly afford matter of speculation, that in civil causes there should be such a variety of writs of execution to recover a trifling debt, issued in the king's name, and under the seal of the court, without which the sheriff cannot legally stir one step; and yet that the

execution of a man, the most important and terrible task of any, should depend upon a marginal note.

Execution.

The sheriff, upon receipt of his warrant, is to do execution within a convenient time; which in the country is also left at large. In London, indeed, a more solemn and becoming exactness is used, both as to the warrant of execution and the time of executing thereof: for the recorder, after reporting to the king in person the case of the several prisoners, and receiving his royal pleasure, that the law must take its course, issues his warrant to the sheriffs, directing them to do execution on the day and at the place assigned. And in the court of king's bench, if the prisoner be tried at the bar, or brought there by *habeas corpus*, a rule is made for his execution; either specifying the time and place, or leaving it to the discretion of the sheriff. And, throughout the kingdom, by statute 25 Geo. II. c. 37. it is enacted that, in case of murder, the judge shall in his sentence direct execution to be performed on the next day but one after sentence passed. But, otherwise, the time and place of execution are by law no part of the judgment. It has been well observed, that it is of great importance that the punishment should follow the crime as early as possible; that the prospect of gratification or advantage, which tempts a man to commit the crime, should instantly awake the attendant idea of punishment. Delay of execution serves only to separate these ideas; and then the execution itself affects the minds of the spectators rather as a terrible sight, than as the necessary consequence of transgression.

The sheriff cannot alter the manner of the execution, by substituting one death for another, without being guilty of felony himself. It is held also by Sir Edward Coke and Sir Matthew Hale, that even the king cannot change the punishment of the law, by altering the hanging or burning into beheading; though, when beheading is part of the sentence, the king may remit the rest. And, notwithstanding some examples to the contrary, Sir Edward Coke stoutly maintains, that *judicandum est legibus, non exemplis*. But others have thought, and more justly, that this prerogative, being founded in mercy, and immemorially exercised by the crown, is part of the common law. For hitherto, in every instance, all these exchanges have been for more merciful kinds of death; and how far this may also fall within the king's power of granting conditional pardons (viz. by remitting a severe kind of death, on condition that the criminal submits to a milder) is a matter that may bear consideration. It is observable, that when Lord Stafford was executed for the popish plot in the reign of King Charles II. the then sheriffs of London, having received the king's writ for beheading him, petitioned the House of Lords, for a command or order from their lordships, how the said judgment should be executed: for, he being prosecuted by impeachment, they entertained a notion (which is said to have been countenanced by Lord Russell), that the king could not pardon any part of the sentence. The lords resolved, that the scruples of the sheriffs were unnecessary; and declared, that the king's writ ought to be obeyed. Disappointed of raising a flame in that assembly, they immediately signified to the House of Commons by one of the members, that they were not satisfied as to the power of the said writ. That house

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Execution took two days to consider of it; and then fully resolved, that the house was *content* that the sheriff do execute Lord Stafford by severing his head from his body. It is farther related, that when afterwards the same Lord Russel was condemned for high treason upon indictment, the king, while he remitted the ignominious part of the sentence, observed, "that his Lordship would now find he was possessed of that prerogative, which in the case of Lord Stafford he had denied him." One can hardly determine (at this distance from those turbulent times), which most to disapprove of, the indecent and sanguinary zeal of the subject, or the cool and cruel farcasm of the sovereign.

To conclude: it is clear, that if, upon judgment to be hanged by the neck till he is dead, the criminal be not thoroughly killed, but revives, the sheriff must hang him again. For the former hanging was no execution of the sentence; and, if a false tenderness were to be indulged in such cases, a multitude of collusions might ensue. Nay, even while abjurations were in force, such a criminal, so reviving, was not allowed to take sanctuary and abjure the realm; but his fleeing to sanctuary was held an escape in the officer.

EXECUTION, in the law of Scotland. See **LAW**, Part III. n° clxxxv. 52. clxxxvi. 15.

EXECUTION, in the French music, is used to denote the manner of singing, or of the performance of a song. "As to the manner of singing, called in France *execution*, no nation may, with any probability, dispute it with the French. If the French, by their commerce with the Italians, have gained a bolder composition, the Italians have made their advantage of the French, in learning of them a more polite, moving, and exquisite execution." St Evremond.

EXECUTIVE POWER. The supreme executive power of these kingdoms is vested by our laws in a single person, the king or queen for the time being. See the article **KING**.

The executive power, in this state, hath a right to a negative in parliament, *i. e.* to refuse assent to any acts offered; otherwise the other two branches of legislative power would, or might, become despotic.

EXECUTOR, a person nominated by a testator, to take care to see his will and testament executed or performed, and his effects disposed of according to the tenor of the will. See **LAW**.

EXECUTOR, in Scots law, signifies either the person intitled to succeed to the moveable estate of one deceased, or who by law or special appointment is intrusted with the administration of it.

EXECUTORY, in law, is where an estate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery, or writ. Leases for years, annuities, conditions, &c. are termed *inheritances executory*.

EXECUTRY, in Scots law, is the moveable estate falling to the executor. Under executry, or moveables, is comprehended every thing that moves itself, or can be moved; such as corns, cattle, furniture, ready money, &c.

EXEDRÆ, in antiquity, denoted halls with many seats, where the philosophers, rhetoricians, and men of learning, met for discourse and disputation. The word occurs in ecclesiastical writers as a general name

for such buildings as were distinct from the main body of the churches, and yet within the limits of the church taken in its largest sense. Among the exedræ the chief was the BAPTISTERY.

EXEGESIS, a discourse by way of explanation or comment upon any subject. In the Scotch universities, there is an exercise among the students in divinity, called an *exegesis*, in which a question is stated by the respondent, who is then opposed by two or three other students in their turns; during which time the professor moderates, and solves the difficulties which the respondent cannot overcome.

EXEGETES, (formed of *ἐξηγομαι* "I explain,") among the Athenians, persons learned in the laws, whom the judges used to consult in capital causes.

EXEGETICA, in algebra, the art of finding, either in numbers or lines, the roots of the equation of a problem, according as the problem is either numerical or geometrical.

EXEMPLAR, a model, or original, to be imitated, or copied. See **MODEL**.

EXEMPLAR also denotes the idea, or image, conceived or formed in the mind of the artist, whereby he conducts his work. Such is the idea of Cæsar, which a painter has in his mind when he goes to make a picture of Cæsar.

EXEMPLIFICATION of letters Patent, denotes an exemplar, or copy of letters patent, made from the enrolment thereof, and sealed with the great seal of England. Such exemplifications are as effectual to be showed, or pleaded, as the letters patent themselves.

EXEMPTION, in law, a privilege to be free from some service or appearance: thus, barons and peers of the realm are, on account of their dignity, exempted from being sworn upon inquests; and knights, clergymen, and others, from appearing at the sheriff's turn. Persons of 70 years of age, apothecaries, &c. are also by law exempted from serving on juries; and justices of the peace, attorneys, &c. from parish-offices.

EXERCISE, among physicians, such an agitation of the body as produces salutary effects in the animal economy.

Exercise may be said to be either active or passive. The active is walking, hunting, dancing, playing at bowls, and the like; as also speaking, and other labour of the body and mind. The passive is riding in a coach, on horseback, or in any other manner. Exercise may be continued to a beginning of weariness, and ought to be used before dinner in a pure light air; for which reason, journeys, and going into the country, contribute greatly to preserve and re-establish health.

Exercise increases the circulation of the blood, attenuates and divides the fluids, and promotes a regular perspiration, as well as a due secretion of all the humours; for it accelerates the animal spirits, and facilitates their distribution into all the fibres of the body, strengthens the parts, creates an appetite, and helps digestion. Whence it arises, that those who accustom themselves to exercise are generally very robust, and seldom subject to diseases.

Boerhaave recommends bodily exercise in diseases of a weak and lax fibre. By riding on horseback, says his commentator, the pendulous viscera of the abdomen are shaken every moment, and gently rubbed as

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it were one against another, while in the mean time the pure air acts on the lungs with greater force. But it is to be observed that a weak man should not ride with a full stomach, but either before dinner, or after the digestion is near finished; for when the stomach is distended, weak people do not bear these concussions of the horse without difficulty; but when the primæ viæ are near empty, the remaining feces are discharged by this concussion. Sailing in a ship is also an exercise of great use to weak people. If the vessel moves with an even motion, by increasing perspiration it usually excites a wonderful alacrity, creates an appetite, and promotes digestion. These exercises are more especially serviceable to weak people; but, in order to strengthen the body by muscular motion, running, and bodily exercises, are to be used. In these we should begin with the most gentle, such as walking, and increase it by degrees till we come to running. Those exercises of the body are more especially serviceable which give delight to the mind at the same time, as tennis, fencing, &c.; for which reason, the wisdom of antiquity appointed rewards for those who excelled in these gymnastic exercises, that by this means the bodies of their youth might be hardened for warlike toils.

As nothing is more conducive to health than moderate exercise, so violent exercise dissipates the spirits, weakens the body, destroys the elasticity of the fibres, and exhausts the fluid parts of the blood. No wonder, then, that acute and mortal fevers often arise from too violent exercise of the body; for the motion of the venous blood towards the heart being quickened by the contraction of the muscles, and the veins being thus depleted, the arteries more easily propel their contained humours through the smallest extremities into the now less resisting veins; and therefore the velocity of the circulation will be increased through all the vessels. But this cannot be performed without applying the humours oftener, or in a greater quantity, to the secretory organs in the same time, whence the more fluid parts of the blood will be dissipated, and what remains will be inspissated; and by the greater action of the vessels upon their contained fluids, and of the reacting fluids upon the vessels, the blood acquires an inflammatory density. Add to this, that by the violent attrition of the solids and fluids, together with the heat thence arising, all the humours will incline to a greater acrimony, and the salts and oils of the blood will become more acrid and volatile. Hence, says Boerhaave, those fevers which arise from too much exercise or motion, are cured by rest of body and mind, with such aliments and medicines as moisten, dilute, and soften or allay acrimony.

The exercise of a soldier in camp, considered as conducive to health, Dr Pringle distinguishes into three heads; the first relating to his duty, the second to his living more commodiously, and the third to his diversions. The first, consisting chiefly in the exercise of his arms, will be no less the means of preserving health than of making him expert in his duty: and frequent returns of this, early, and before the sun grows hot, will be made more advantageous than repeating it seldom, and staying out long at a time; for a camp affording little convenience for refreshment, all unnecessary fatigue is to be avoided. As to the second article, cutting boughs for shading the tents, making trenches

round them for carrying off the water, airing the straw, cleaning their clothes and accoutrements, and assisting in the business of the mess, ought to be no disagreeable exercise to the men for some part of the day. Lastly, as to diversions, the men must be encouraged to them either by the example of their officers, or by small premiums to those who shall excel in any kind of sports as shall be judged most conducive to health: but herein great caution is necessary, not to allow them to fatigue themselves too much, especially in hot weather or sickly times; but above all, that their cloaths be kept dry, wet clothes being the most frequent causes of camp-diseases.

EXERCISE, in military affairs, is the ranging a body of soldiers in form of battle, and making them perform the several motions and military evolutions with different management of their arms, in order to make them expert therein. See also *WORDS of Command*.

EXERCISE, in the royal navy, is the preparatory practice of managing the artillery and small arms, in order to make the ship's crew perfectly skilled therein, so as to direct its execution successfully in the time of battle.

The exercise of the great guns was, till lately, very complicated, and abounding with superfluities, in our navy, as well as all others. The following method was then successfully introduced by an officer of distinguished abilities.

- 1st, Silence.
- 2d, Cast loose your guns.
- 3d, Level your guns.
- 4th, Take out your tompons.
- 5th, Run out your guns.
- 6th, Prime.
- 7th, Point your guns.
- 8th, Fire.
- 9th, Spunge your guns.
- 10th, Load with cartridge.
- 11th, Shot your guns.
- 12th, Put in your tompons.
- 13th, House your guns.
- 14th, Secure your guns.

Upon beat-to-arms (every body having immediately repaired to their quarters) the midshipman commanding a number of guns, is to see that they are not without every necessary article, as (at every gun) a sponge, powder-horn, with its priming wires, and a sufficient quantity of powder, crow, hand spike, bed, quoin, train-tackle, &c. sending without delay for a supply of any thing that may be amissing; and for the greater certainty of not overlooking any deficiency, he is to give strict orders to each captain under him, to make the like examination at his respective gun, and to take care that every requisite is in a serviceable condition, which he is to report accordingly. And (besides the other advantages of this regulation) for the still more certain and speedy account being taken upon these occasions, the midshipman is to give each man his charge at quarters (as expressed in the form of the monthly report), who is to search for his particular implements, and, not finding them, is immediately to acquaint his captain, that, upon his report to the midshipman, they may be replaced.

The man who takes care of the powder is to place himself on the opposite side of the deck from that where

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where we engage, except when fighting both sides at once, when he is to be amid-ships. He is not to suffer any other man to take a cartridge from him but he who is appointed to serve the gun with that article, either in time of a real engagement or at exercise.

Lanterns are not to be brought to quarters in the night, until the midshipman gives his orders for so doing to the person he charges with that article. Every thing being in its place, and not the least lumber in the way of the guns, the exercise begins with,

1. "Silence." At this word every one is to observe a silent attention to the officers.

2. "Cast loose your guns." The muzzle lashing is to be taken off from the guns, and (being coiled up in a small compass) is to be made fast to the eye-bolt above the port. The lashing-tackles at the same time to be cast loose, and middle of the breeching seized to the thimble of the pomillion. The sponge to be taken down, and, with the crow, hand-spike, &c. laid upon the deck by the gun. N. B. When prepared for engaging an enemy, the seizing within the clinch of the breeching is to be cut, that the gun may come sufficiently within-board for loading, and that the force of the recoil may be more spent before it acts upon the breeching.

3. "Level your guns." The breech of your metal is to be raised so as to admit the foot of the bed's being placed upon the axle-tree of the carriage, with the quoin upon the bed, both their ends being even one with the other. N. B. When levelled for firing, the bed is to be lashed to the bolt which supports the inner end of it, that it may not be thrown out of its place by the violence of the gun's motion when hot with frequent discharges.

4. "Take out your tompions." The tompion is to be taken out of the gun's mouth, and left hanging by its laniard.

5. "Run out your guns." With the tackles hooked to the upper bolts of the carriage, the gun is to be bowled out as close as possible, without the assistance of crows or hand-spikes; taking care at the same time to keep the breeching clear of the trucks, by hauling it through the rings; it is then to be bent so as to run clear when the gun is fired. When the gun is out, the tackle-falls are to be laid along-side the carriages in neat fakes, that, when the gun by recoiling overhauls them, they may not be subject to get foul, as they would if in a common coil.

6. "Prime." If the cartridge is to be pierced with the priming-wire, and the vent filled with powder, the pan also is to be filled; and the flat space, having a score through it at the end of the pan, is to be covered, and this part of the priming is to be bruised with the round part of the horn. The apron is to be laid over, and the horn hung up out of danger from the flash of the priming.

7. "Point your guns." At this command the gun is, in the first place, to be elevated to the height of the object, by means of the side-fights; and then the person pointing is to direct his fire by the upper sight, having a crow on one side and a hand-spike on the other, to heave the gun by his direction till he catches the object.

N. B. The men who heave the gun for pointing are to stand between the ship's side and their crows or

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hand-spikes, to escape the injury they might otherwise receive from their being struck against them, or splintered by a shot; and the man who attends the captain with a match is to bring it at the word, "Point your guns," and kneeling upon one knee opposite the train-truck of the carriage, and at such a distance as to be able to touch the priming, is to turn his head from the gun, and keep blowing gently upon the lighted match to keep it clear from ashes. And as the missing of an enemy in action, by neglect or want of coolness, is most inexcusable, it is particularly recommended to have the people thoroughly instructed in pointing well, and taught to know the ill consequences of not taking proper means to hit their mark; wherefore they should be made to elevate their guns to the utmost nicety, and then to point with the same exactness, having caught the object through the upper sight. At the word,

8. "Fire." The match is instantly to be put to the bruised part of the priming; and when the gun is discharged, the vent is to be closed, in order to smother any spark of fire that may remain in the chamber of the gun; and the man who sponges is immediately to place himself by the muzzle of the gun in readiness; when, at the next word,

9. "Sponge your gun." The sponge is to be rammed down to the bottom of the chamber, and then twisted round, to extinguish effectually any remains of fire; and, when drawn out, to be struck against the out-side of the muzzle, to shake off any sparks or scraps of the cartridge that may have come out with it; and next, its end is to be shifted ready for loading; and while this is doing, the man appointed to provide a cartridge is to go to the box, and by the time the sponge is out of the gun, he is to have it ready; and at the word,

10. "Load with cartridge." The cartridge (with the bottom end first, seam downwards, and a wad after it) is to be put into the gun, and thrust a little way within the mouth, when the rammer is to be entered: the cartridge is then to be forcibly rammed down; and the captain at the same time is to keep his priming-wire in the vent, and, feeling the cartridge, is to give the word *home*, when the rammer is to be drawn, and not before. While this is doing, the man appointed to provide a shot is to provide one (or two, according to the order at that time) ready at the muzzle, with a wad likewise; and when the rammer is drawn, at the word,

11. "Shot your guns." The shot and wad upon it are to be put into the gun, and thrust a little way down, when the rammer is to be entered as before. The shot and wad are to be rammed down to the cartridge, and there have a couple of forcible strokes; when the rammer is to be drawn, and laid out of the way of the guns and tackles, if the exercise or action is continued; but if it is over, the sponge is to be secured in the place it is at all times kept in.

12. "Put in your tompions." The tompions to be put into the muzzle of the cannon.

13. "House your guns." The seizing is to be put on again upon the clinched end of the breeching, leaving it no slacker than to admit of the guns being housed with ease. The quoin is to be taken from under the breech of the gun, and the bed, still resting upon

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upon the bolt, within the carriage, thrust under, till the foot of it falls off the axle-tree, leaving it to rest upon the end which projects out from the foot. The metal is to be let down upon this. The gun is to be placed exactly square; and the muzzle is to be close to the wood, in its proper place for passing the muzzle-lashings.

14. "Secure your guns." The muzzle-lashings must first be made secure, and then with one tackle (having all its parts equally taught with the breeching) the gun is to be lashed. The other tackle is to be bowfed taught, and by itself made fast, that it may be ready to cast off for lashing a second breeching. N. B. Care must be taken to hook the first tackle to the upper bolt of the carriage, that it may not otherwise obstruct the reeving of the second breeching, and to give the greater length to the end part of the fall. No pains must be spared in bowfing the lashing very taught, that the gun may have the least play that is possible, as their being loose may be productive of very dangerous consequences. The quoin, crow, and hand-spike, are to be put under the gun, the powder-horn hung up in its place, &c.

Being engaged at any time when there is a large swell, a rough sea, or in squally weather, &c. as the ship may be liable to be suddenly much heeled, the port-tackle fall is to be kept clear, and (whenever the working of the gun will admit of it) the man charged with that office is to keep it in his hand; at the same time the muzzle-lashing is to be kept fast to the ring of the port, and, being hauled taught, is to be fastened to the eye-bolt over the port-hole, so as to be out of the gun's way in firing, in order to haul it in at any time of danger.

This precaution is not to be omitted, when engaging to the windward, any more than when to the leeward, those situations being very subject to alter at too short a warning.

A train-tackle is always to be made use of with the lee-guns; and the man stationed to attend it is to be very careful in preventing the guns running out at an improper time.

EXERCISE, may also be applied with propriety to the forming our fleets into orders of sailing, lines of battle, &c. an art which the French have termed *évolutions*, or *tactiques*. In this sense exercise may be defined, the execution of the movements which the different orders and disposition of fleets occasionally require, and which the several ships are directed to perform by means of signals. See TACTICS.

EXERCISES, are also understood of what young gentlemen learn in the academies and riding-schools, such as fencing, drawing, riding the great horse, &c.

How useful, how agreeable soever, study may be to the mind, it is very far from being equally salutary to the body. Every one observes, that the Creator has formed an intimate connection between the body and the mind; a perpetual action and reaction, by which the body instantly feels the disorders of the mind, and the mind those of the body. The delicate springs of our frail machines lose their activity and become enervated, and the vessels are choaked by obstructions when we totally desist from exercise, and the consequences necessarily affect the brain: a more studious and fe-

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dentary life is therefore equally prejudicial to the body and the mind. The limbs likewise become stiff; we contract an awkward constrained manner; a certain disgusting air attends all our actions, and we are very near being as disagreeable to ourselves as to others. An inclination to study is highly commendable; but it ought not, however, to inspire us with an aversion to society. The natural lot of man is to live among his fellows: and whatever may be the condition of our birth, or our situation in life, there are a thousand occasions where a man must naturally desire to render himself agreeable; to be active and adroit; to dance with a grace; to command the fiery steed; to defend himself against a brutal enemy; to preserve his life by dexterity; as by leaping, swimming, &c. Many rational causes have therefore given rise to the practice of particular exercises; and the most sagacious and benevolent legislators have instituted, in their academies and universities, proper methods of enabling youth, who devote themselves to study, to become expert also in laudable exercises.

EXERCITOR, in Scots law, he who employs a ship in trade, whether he be owner, or only freighter her from the owner.

EXERGESIA. See ORATORY, n° 90.

EXERGUM, among antiquarians, a little space around or without the figures of a medal, left for the inscription, cipher, device, date, &c.

EXETER, the capital city of Devonshire, situated on the river Ex, ten miles north of the British channel: W. Long. 3. 40. N. Lat. 50. 44. Anciently the name of this city was *Ifex*, and *Ifia Dumnoniorum*. The present name is a contraction of *Excester*, that is, a city upon the Ex. It is large, populous, and wealthy, with gates, walls, and suburbs: the circumference of the whole is about three miles. It is the see of a bishop, transferred hither from Crediton, by Edward the Confessor; and is one of the principal cities in the kingdom for its buildings, wealth, and number of its inhabitants. It had six gates, besides many turrets, several of which are now pulled down. It had formerly so many convents, that it was called *Monk-town*, till king Athelstan changed its name to Exeter, about the year 940; at which time he also fortified the city (which had before been only inclosed with a ditch and a fence of timber) with circular walls, embattlements, towers, and turrets of squared stone, encircling the whole, except the western side, with a deep moat. Besides chapels and 5 large meeting-houses; there are now 15 churches within the walls, and 4 without. St Peter's, the cathedral, is a magnificent pile; though little now remains of the ancient fabric of the church, except that part which is called *Our Lady's Chapel*. It has a ring of 12 bells, reckoned the largest ring of the largest bells in England; as is also its organ, whose largest pipes are 15 inches in diameter. In 1763 the cathedral was repaired, beautified, and new paved; when, in removing the old pavement, was found the leaden coffin of bishop Bitton, who died in 1307; the top of which, being decayed, afforded an opportunity of viewing the skeleton lying in its proper form: near the bones of the finger was found a sapphire ring set in gold; the stone considerably large, but of no great value, on account

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Exeter.

Exeter. of several flaws in it. Near this stood a small neat chalice and patten of silver gilt, but the damp had destroyed the greatest part of the gilding. In the centre of the patten was engraved a hand, with the two fore-fingers extended in the attitude of benediction. The top of the crozier was also found, but totally decayed. A most beautiful modern painted glass window has been lately erected at the western end of the cathedral, the eastern end having before a remarkable fine antique one. In the other windows there is much fine ancient painted glass. The altar is remarkable for its beautiful design and execution. On the left-hand side of it there yet exists the seat where Edward the Confessor and his queen sat and installed Leofricus his chancellor, the first bishop of Exeter; and in the south cross aisle is the monument of the same Leofricus, who died 1073, which at the time of his interment was a part of the church-yard, but by the enlarging of the church by his successors became nearly the middle of the building. The grand western end of the church is most magnificently adorned with the statues of the patriarchs, &c. The Chapter-house was built in 1439. The beautiful throne for the bishop was constructed about 1466, and is said to be the grandest of the kind in Britain. The great north tower was completed in 1485, which contains a bell that weighs 12,500 pounds; and exceeds the great Tom of Lincoln by 2,500 pounds. This city has had divers charters granted, or confirmed, by most of our kings; but it was made a mayor town in the reign of King John, and a county of itself by king Henry VIII. It is governed by a mayor, 24 aldermen, 4 bailiffs, a recorder, chamberlain, sheriff, town-clerk, &c. They have a sword-bearer, and four stewards, four sergeants at mace wearing gowns, and staff-bearers in liveries with silver badges. It had anciently a mint; and in the reigns of king William III. and queen Anne, many pieces of silver money were coined here, which have the letter E under the bust. Here are 12 or 13 incorporate city-companies. All pleas and civil causes are tried by the mayor, recorder, aldermen, and common council; but criminal causes, and those relating to the peace, are determined by eight aldermen, who are justices of the peace. Here are four principal streets, all centring in the middle of the city, which is therefore called *Carfax*, from the old Norman word *Quatre voix*, i. e. the four ways. Near it is a conduit, lately removed from the centre to the side of the principal street, which was first erected by William Duke, mayor of the city, in the reign of Edward IV. and there are others well supplied with water brought in pipes from the neighbourhood. There is an old castle in the north-east part of the city, called *Rougemont*, from the red soil it stands on; from thence there is a pleasant prospect from the walls. It is supposed to have been built by the West Saxon kings, and that they resided here, as did afterwards the earls and dukes of Cornwall. This castle was remarkably strong both by nature and art. The gate, which originally led into it, was walled up by order of William the Conqueror, in token of his having reduced it to his obedience after a very obstinate resistance; and close by it an inferior gate was made in the wall, in which state they both remain. The outward stone-facing is kept in tolerable repair; but the inside,

being but earth, is gradually crumbled down. Here yet remains the ancient chapel, built in 1260, and kept in good repair, where prayers are read and a sermon preached in sessions weeks. The city itself is healthy, and pleasantly situated on the sides of a hill, having other hills to its N. W. and S. by which it is sheltered from the force of storms. The bank which sustained the ditch that in a great part surrounded the castle, is planted and gravelled, and accommodated with seats, it being the place of resort for walking for the inhabitants; and the ditch between it and the castle being filled up, is now thickly planted with elms, which form a delightful grove. The old palace is now entirely demolished, and an elegant sessions-house erected, where the assizes, quarter-sessions, and county courts are held. In the city and suburbs are prisons both for debtors and malefactors; a workhouse, alms-houses, and charity-schools; an hospital for the sick and lame poor of the city and county, upon the model of the infirmaries of London and Westminster; and two free grammar-schools. It has markets on Wednesdays and Fridays; and four fairs in the year. Great trade is carried on here for serges, perpetuanas, long-ells, and other woollen goods, in which it is computed that at least 600,000l. a-year is traded for; yet no markets were erected here for wool, yarn, and kerseys, till the 30th of Henry VIII. Before that time, the merchants drove a considerable trade to Spain and France: they were incorporated, in the reign of Queen Mary I. by the name of "The governor, consuls, and society of merchant adventurers, trading to France." Here is also a weekly serge market, the greatest in England, next to the Brigg market at Leeds in Yorkshire: it is said that some weeks as many serges have been sold here as amount to 80,000l. or 100,000l.; for besides the vast quantities of their woollen goods shipped for Portugal, Spain, and Italy, the Dutch give large commissions for buying up serges, perpetuanas, &c. for Holland and Germany. It is particularly remarked of this city, that it is almost as full of gentry as of tradesmen; and that more of its mayors and bailiffs have descended from, or given rise to, good families, than in any other city of its bigness in the kingdom; for the great trade and flourishing state of this city tempted gentlemen to settle their sons in it, contrary to the practice of many of the inland as well as northern counties, where, according to the vain and ruinous notion of the Normans, trade was despised by the gentry, as fit only for mechanics and the vulgar. The city was under the jurisdiction of the Romans, whose coins have been frequently dug up in and about it. After they left England, the Saxons drove the Britons out of it into Cornwall, and encompassed it with a ditch, besides bulwarks. The Danes attacked and spoiled it in 875; and afterwards, in revenge of the general massacre of the Danes by the English, Swain, one of their kings, came hither with a great force, put the men to the sword, ravished the women, massacred the children, burnt the city, and defaced the walls. A long time after this, just as it was reviving, William the Conqueror besieged and took it; and it was again besieged in the reigns of king Stephen and Edward IV. In the reign of Henry VII. it was again besieged by Perkin Warbeck, and battered furiously; but the citizens forced him to raise the

Exeter.

siege

Exeter.

siege; which so pleased the king, that he came hither, and presented a cap of maintenance to the city, and gave the very sword from his side to be borne always before the mayor. In the reign of Edward VI, in July 1544, it was smartly cannonaded by the rebels of Cornwall and Devon, who almost starved it by breaking down its bridges, cutting off its water, and stopping up all passages; but it held out till the lord John Russell came with a force and raised the siege on the 6th of August, which was then appointed as an anniversary day of thanksgiving by the city, and is still observed as such. King Charles I.'s queen, to whom this city gave shelter in the civil wars, was here delivered of Henrietta, afterwards duchess of Orleans; whose picture is in its Guild-Hall, as are also General Monk's and George I.'s, &c. In the south-east quarter of the city was a house called *Bedford-house*, wherein the above queen was delivered of the princess. This having lately been taken down, an elegant circus is built on the spot, with a theatre adjoining it; and for the convenience of the inhabitants, a passage has been made through the town-wall to Southern Hay, on which green stands the county hospital, already spoken of, besides a considerable number of new buildings. There are remains of several ancient structures, which are daily giving way to modern erections; among the rest, an old building, said to have been a palace of king Athelstan. The Guildhall is a spacious and convenient building, whose front or portico projects a great way into the street, and was first erected in 1330, to which its present front was rebuilt in 1593, and repaired in 1720. An arm of the sea formerly flowed nearly up to the city's wall, till 1316, when Hugh Courtenay earl of Devon, in revenge for an affront, ruined the navigation, by constructing weirs and dams in the river; but to remedy it, in 1539, an act of parliament passed for making a navigable canal, for the better conveyance of goods in barges to and from the city to Topsham. This was carried into execution in 1581, but not completed till 1675; nor was it after all found sufficient, till the present haven was constructed in 1697, when it was rendered capable of bringing ships of 150 tons quite to the quay, constructed near the walls of the city. In short, Exeter, by a constant adherence to its motto, *Semper fidelis*, has been applauded by all historians for its inviolable fidelity to its sovereigns, whether they held their crown by hereditary or parliamentary right. The city sends two members to parliament; and gives title of Earl to the Cecils.—The see of Exeter was once one of the most wealthy in the kingdom; but its revenues were most shamefully wasted by bishop Voysey, who alienated its lands. What little he left was so much incumbered, that the see has never been able to recover its former grandeur; and so small are its present revenues, that it has been found necessary for the bishop to hold some other preferment for the better support of his dignity and rank. This see hath yielded to the nation three lord chancellors, two lord treasurers, one lord president of Wales, and one chancellor to the university of Oxford. The diocese contains the entire counties of Devonshire and Cornwall, wherein are 604 parishes, whereof 239 are impropriate. It hath four archdeacons, viz. of Cornwall, Exeter, Barnstable, and Totnes. The diocese was formerly valued in the king's books at L. 1556 : 14 : 6; but, since bishop Voysey's

time, it is lowered to L. 500, and is computed to be worth annually L. 2700. The clergy's tenth is L. 1200 : 15 : 2½. To the cathedral belong a bishop, a dean, four archdeacons, a chancellor, a treasurer, a chanter, 24 prebendaries, and other inferior officers and servants.

EXFOLIATION, a term used by surgeons for the scaling of a bone, or its rising and separating into thin laminae or scales.

EXHALATION, a general term for all effluvia or steams raised from the surface of the earth in form of vapour.

EXHAUSTIONS, in mathematics. Method of exhaustions, is a way of proving the equality of two magnitudes, by a *reductio ad absurdum*; showing, that if one be supposed either greater or less than the other, there will arise a contradiction.

The method of exhaustions was of frequent use among the ancient mathematicians; as Euclid, Archimedes, &c. It is founded on what Euclid says in his tenth book; viz. that those quantities whose difference is less than any assignable quantity, are equal; for if they were unequal, be the difference never so small, yet it may be so multiplied, as to become greater than either of them; if not so, then it is really nothing. This he assumes in the proof of prop. 1. book x. which imports, that if, from the greater of two quantities, you take more than its half, and from the remainder more than its half, and so continually, there will, at length, remain a quantity less than either of those proposed. On this foundation it is demonstrated, that if a regular polygon of infinite sides be inscribed in, or circumscribed about, a circle; the space, which is the difference between the circle and the polygon, will, by degrees, be quite exhausted, and the circle become equal to the polygon.

EXHEREDATION, in the civil law, with us ordinarily called *disinheriting*, is the father's excluding his son from inheriting his estate.

There are 14 causes of exheredation expressed in Justinian's Novel; without some one of which causes, he decrees the exheredation null, and the testament inofficious, as the civilians call it. Indeed, by the ancient Roman law, the father might pronounce exheredation without any cause; but the rigour of this law was restrained and moderated by Justinian.

EXHIBIT, in law, is where a deed, or other writing, being produced in a chancery suit to be proved by witnesses, the examiner, or commissioner appointed for the examination of any such, certifies on the back of the deed or writing, that the same was shown to the witness at the time of his examination, and by him sworn to.

EXHIBITION, in law, a producing, or showing, of titles, authorities, and other proofs, of a matter in contest.

Anciently they used the phrase, *exhibition* of a tragedy, comedy, or the like; but now we say *representation* in lieu thereof.

EXHIBITION, in our old writers, is used for an allowance of meat and drink, such as was customary among the religious appropriators of churches, who usually made it to the depending vicar. The benefactions settled for the maintaining of scholars in the universities, not depending on the foundation, are also called *exhibitions*.

Exfoliation
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Exhibition.

Exhorta-
tion
||
Exocoetus.

EXHORTATION, in rhetoric, differs only from *suasion*, in that the latter principally endeavours to convince the understanding, and the former to work on the affections.

EXHUMATION, (of *ex* "out of," and *humus* "ground,") the act of digging up a body interred in holy ground, by the authority of the judge. In France, the exhumation of a dead body is ordered, upon proof that he was killed in a duel. By the French laws, a parson has a right to demand the exhumation of the body of one of his parishioners, when interred out of the parish without his consent.

EXIGENCE, or EXIGENCY, that which a thing requires, or which is expedient and suitable thereto.

EXIGENT, in law, a writ which lies where the defendant in a personal action cannot be found, nor any effects of his within the county, by which he may be attached or distrained.

EXIGENTERS, four officers in the court of common-pleas, who make all exigents and proclamations, in all actions where process of outlawry lies. Writs of superfeudas, as well as the prothonotaries, upon exigents, were likewise drawn up in their office.

EXILE. See BANISHMENT.

Among the Romans, the word *exilium* properly signified an interdiction or exclusion from water and fire; the necessary consequence of which was, that the interdicted person must betake himself into some other country, since there was no living without fire and water.—Thus Cicero, *ad Herenn.* observes, that the form of the sentence did not express *exilium*, but only *aque & ignis interdictio*. The same author remarks, that exile was not properly a punishment, but a voluntarily flying or avoiding the punishment decreed: *Exilium non esse supplicium, sed perfugium, partisque supplicii*. He adds, that there was no crime among the Romans, as among other nations, punished with exile; but exile was a resource to which people flew voluntarily, in order to avoid chains, ignominy, starving, &c.

The Athenians frequently sent their generals and great men into exile, out of envy of their merits, or distrust of their too great authority. See OSTRACISM.

EXISTENCE, that whereby any thing has an actual essence, or is said to be. See the article METAPHYSICS.

EXIT, properly expresses the departure of a player from off the stage, when he has acted his part. The word is also used in a figurative sense, to express any kind of departure, even death.

EXITERIA, in antiquity, oblations or prayers to any of the gods for a prosperous expedition or journey. There were also feasts under this denomination, which were celebrated by the Greeks with sacrifices and prayers, when their generals undertook expeditions against any enemy.

EXOCOETUS, or the FLYING-FISH, in ichthyology, a genus belonging to the order of abdominales. The head is scaly, and it has no teeth; it has 10 radii in the branchiostegæ membrane; the body is whitish, and the belly is angular: the pectoral fins, the instruments of flight, are very large. When pursued by any other fish, it raises itself from the water by means of these long fins, and flies in the air to a considerable distance, till the fins dry, and then it falls down into the water. It is a fish that seems to lead a most miserable

life. In its own element, it is perpetually harassed by the dorados and other fish of prey. If it endeavours to avoid them by having recourse to the air, it either meets its fate from the gulls or the albatross, or is forced down again into the mouth of the inhabitants of the water, who, below, keep pace with its aerial excursion. This fish is caught in the Mediterranean and some other seas. It is most common between the tropics, and there its enemies are more particularly numerous. In these climates the flying fishes spring out of the water by hundreds, to escape the rapacity of the dolphins, sharks, &c. When flying, they have as formidable enemies to encounter with in that element, viz. the pelican, eagle, diomedea, &c. and frequently throw themselves on board the ships to escape their pursuit. Their flesh is said to be palatable and nourishing food.

EXODIARY, in the ancient Roman tragedy, was the person who, after the drama or play was ended, sung the EXODIUM.

EXODIUM, in the ancient Greek drama, one of the four parts or divisions of tragedy, being so much of the piece as included the catastrophe and unravelling of the plot, and answering nearly to our fourth and fifth acts.

EXODIUM, among the Romans, consisted of certain humorous verses rehearsed by the exodiary at the end of the *Fabulæ Atellanæ*.

EXODIUM, in the Septuagint, signifies the end or conclusion of a feast. Particularly it is used for the eighth day of the feast of tabernacles, which, it is said, had a special view to the commemoration of the *exodus* or departure out of Egypt.

EXODUS, a canonical book of the Old Testament; being the second of the pentateuch, or five books of Moses.

It is so called from the Greek [*exodos*], the "going out" or departure of the children of Israel from the land of Egypt; the history of which is delivered in this book, together with the many miracles wrought on that occasion.

EXOMPHALUS, in surgery, called also *omphalocele*, and *hernia umbilicalis*, is a preternatural tumor of the abdomen, at the navel, from a rupture or distention of the parts which invest that cavity.

EXORCISM, the expelling of devils from persons possessed, by means of conjurations and prayers. The Jews made great pretences to this power. Josephus tells several wonderful tales of the great success of several exorcists. One Eleazer, a Jew, cured many dæmoniacks, he says, by means of a root set in a ring. This root, with the ring, was held under the patient's nose, and the devil was forthwith evacuated. The most part of conjurors of this class were impostors, each pretending to a secret nostrum or charm which was an overmatch for the devil. Our Saviour communicated to his disciples a real power over dæmons, or perhaps over the diseases said to be occasioned by dæmons. See DÆMONIAC.

Exorcism makes a considerable part of the superstition of the church of Rome, the rituals of which forbid the exorcising any person without the bishop's leave. The ceremony is performed at the lower end of the church, towards the door. The exorcist first signs the possessed person with the sign of the cross, makes him kneel,

Exodiary
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Exorcism.

Exorcists
or
Exotic.

kneel, and sprinkles him with holy water. Then follow the litanies, psalms, and prayer; after which the exorcist asks the devil his name, and adjures him by the mysteries of the Christian religion not to afflict the person any more; then, laying his right hand on the demoniac's head, he repeats the form of exorcism, which is this: "I exorcise thee, unclean spirit, in the name of Jesus Christ: tremble, O Satan! thou enemy of the faith, thou foe of mankind, who hast brought death into the world; who hast deprived men of life, and hast rebelled against justice; thou seducer of mankind, thou root of evil, thou source of avarice, discord, and envy." The Romanists likewise exorcise houses and other places, supposed to be haunted by unclean spirits; and the ceremony is much the same with that for persons possessed.

EXORCISTS, in church-history, an order of men, in the ancient church, whose employment it was to exorcise or cast out devils. See the preceding article.

EXORDIUM, in oratory, is the preamble or beginning, serving to prepare the audience for the rest of the discourse.

Exordiums are of two kinds; either just and formal, or vehement and abrupt. The last are most suitable on occasions of extraordinary joy, indignation, or the like. See ORATORY, n° 26.

EXOSTOSIS (from *εξ* out, and *οστος* a bone), in anatomy, an acute eminence or excrescence, pushing preternaturally above the bone.

EXOTERIC and ESOTERIC, are terms denoting *external* and *internal*, and applied to the double doctrine of the ancient philosophers: the one was public or *exoteric*; the other secret, or *esoteric*. The first was that which they openly professed and taught to the world; the latter was confined to a small number of chosen disciples. This method was derived originally from the Egyptians; who, according to the united testimony of Herodotus, Diodorus Siculus, Strabo, Plutarch, &c. had a twofold philosophy, one secret and sacred, another public and common. The same practice also obtained among the Persian Magi, the Druids of the Gauls, and the Brahmins of India. The Egyptian priests, with whom it originated, sustained the character of judges and magistrates, and probably introduced this distinction with a view to the public welfare, and to serve the purposes of legislation and government. Clement of Alexandria informs us, that they communicated their mysteries principally to those who were concerned in the administration of the state; and Plutarch confirms the same declaration. However, others have supposed that they invented the fables of their gods and heroes, and the other external ceremonies of their religion, to disguise and conceal natural and moral truths; but whatever was the motive of their practice, it was certainly applied to political purposes.

EXOTIC, a term properly signifying *foreign* or *extraneous*, i. e. brought from a remote or strange country. In which sense we sometimes say *exotic* or *barbarous terms* or *words*, &c. The word is derived from the Greek *εξω*, *εξωθεν*, *extra*, "without, on the outside."

Exotic, is chiefly applied to plants which are natives of foreign countries, particularly those brought from the East and West Indies, and which do not naturally grow in Europe.

The generality of exotics, or exotic plants, do not thrive in England without some peculiar care and culture; they require the warmth of their own climates; whence the use of hot-beds, glass-frames, green houses, &c. See *GREEN-HOUSE* and *STOVE*.

EXPANSION, among metaphysicians, denotes the idea we have of lasting distance, all whose parts exist together.

EXPANSION, in physiology, the enlargement or increase of bulk in bodies, chiefly by means of heat. This is one of the most general effects of that subtle principle, being common to all bodies whatever, whether solid or fluid. In some few cases, indeed, bodies seem to expand as they grow cold, as water in the act of freezing: but this is found to be owing to the extrication of an infinite number of air-bubbles from the fluid at a certain time; and is not at all a regular and gradual expansion like that of metals, or any other solid or fluid substance by means of heat. In certain metals also, an expansion takes place when they pass from a fluid to a solid state: but this too is not to be accounted any proper effect of cold, but of the arrangement of the parts of the metals in a certain manner; and is therefore to be accounted a kind of crystallization rather than any thing else.

The expansion of bodies by heat is very various, and in solids does not seem to be guided by any certain rule. In the 48th volume of the Philosophical Transactions, Mr Smeaton has given a table of the expansions of many different substances, from which the following particulars are extracted. The degree of heat employed was 180 degrees of Fahrenheit's thermometer, and the expansion is expressed in 10,000th parts of an English inch.

A foot of white glass barometer tube	100
Martial regulus of antimony	130
Blistered steel	138
Hard steel	147
Iron	151
Bismuth	167
Hammered copper	204
A mixture of three parts of copper with one of tin	218
Cast brass	225
A mixture of 16 parts of brass with one of tin	229
Brass wire	232
Speculum metal	232
Spelter folder, composed of two parts of brass and one of zinc	247
Fine Pewter	274
Grain tin	298
Soft folder, composed of two parts of lead and one of tin	301
A mixture of eight parts of zinc and one of tin, a little hammered	323
Lead	344
Zinc or spelter	353
Zinc hammered an inch per foot	373

From this table it appears, that no rule can be deduced concerning the degree of expansion to which bodies are subject by the same degree of heat, either from their specific gravity or otherwise. Zinc, which is much lighter than lead, expands more with heat; but glass, which is lighter than either, expands much less; while

Expansion while copper, which is heavier than a mixture of brass and tin, expands less.

Expectation.

Of all known substances, those of the aerial kind expand most by an equal degree of heat; and in general the greater quantity of latent heat that any substance contains, the more easily is it expanded; though even here we cannot form any general rule. It is certain, however, that the most dense fluids, such as mercury, oil of vitriol, &c. are less expansible than water, spirit of wine, or ether. This last indeed is so easily expanded, that were it not for the pressure of the atmosphere it would be in a continual state of vapour.

After bodies are reduced to a vaporous state, their expansion seems to go on without any limitation, in proportion to the degree of heat applied; so that it is impossible to say what would be the ultimate effects of that principle upon them in this way. The force with which these vapours expand on the application of high degrees is very great; neither can we say, that any obstacle whatever is insuperable by them. On this principle depend the steam-engines so much used in various mechanical operations; likewise some hydraulic machines; and the instruments called *manometers*, which show the variation of gravity in the external atmosphere, by the expansion or condensation of a small quantity of air confined in a proper vessel. On this principle also perpetual movements might be constructed similar to those invented by Mr. Cox, on the principle of the barometer. A variety of other curious machines may be constructed on the principle of aerial expansion; of which an account is given under the articles *HYDROSTATICS* and *PNEUMATICS*.

The expansion of solid bodies is measured by an instrument named the *Pyrometer*; and the force with which they expand is still greater than that of aerial vapours, the flame of a farthing candle producing an expansion in a bar of iron capable of counteracting a weight of 500 pounds. The quantity of expansion, however, is so small, that it has never been applied to the movement of any mechanical engine. On the principle of the expansion of fluids *THERMOMETERS* are constructed; for an account of which, see that article. For the effects of the different expansions of metals in correcting the errors of machines for measuring time, see the article *PENDULUM*.

EXPECTANCY, *ESTATES IN*, are of two sorts; one created by act of the parties, called a *remainder*; the other, by act of law, called a *reversion*.

EXPECTATION, in the doctrine of chances, is applied to any contingent event, and is capable of being reduced to the rules of computation. Thus a sum of money in expectation, when a particular event happens, has a determinate value before that event happens; so that if a person is to receive any sum, *e. gr.*

10l. when an event takes place which has an equal probability of happening and failing, the value of the expectation is half that sum or 5l. and in all cases the expectation of obtaining any sum is estimated by multiplying the value of the sum expected by the fraction which represents the probability of obtaining it. The expectation of a person who has three chances in five of obtaining 100l. is equal to $\frac{3}{5} \times 100$ or 60l. and the probability of obtaining 100l. in this case is equal to $\frac{3}{5} = \frac{60}{100}$.

EXPECTORANTS, in pharmacy, medicines which promote *EXPECTORATION*.

EXPECTORATION, the act of evacuating or bringing up phlegm or other matters out of the trachea, lungs, &c. by coughing, hawking, spitting, &c.

EXPEDITATION, in the forest-laws, signifies a cutting out the balls of a dog's fore-feet for the preservation of the king's game.

Every one that keeps any great dog not expeditated forfeits three shillings and fourpence to the king. In mastiffs, not the ball of the feet, but the three claws, are to be cut to the skin. *Instit. part iv. p. 308.*

This expeditation was to be performed once in every three years, and was done to every man's dog who lived near the forest, and even the dogs of the foresters themselves.

EXPEDITION, the march of an army to some distant place, with a view of hostilities. Such were the expeditions of Cyrus against Xerxes, and of Bacchus and Alexander into the Indies.

Expeditions for the recovery of the Holy Land were called *croisades*.

EXPERIENCE, a kind of knowledge acquired by long use without any teacher. It consists in the ideas of things we have seen or read, which the judgment has reflected on, to form for itself a rule or method.

Authors make three kinds of experience: The first is the simple uses of the external senses, whereby we perceive the phenomena of natural things without any direct attention thereto, or making any application thereof. The second is, when we premeditatedly and designedly make trials of various things, or observe those done by others, attending closely to all effects and circumstances. The third is that preceded by a foreknowledge, or at least an apprehension of the event, and determines whether the apprehension were true or false; which two latter kinds, especially the third, are of great service in philosophy.

EXPERIMENT, in philosophy, is the trial of the result or effect of the applications and motions of certain natural bodies, in order to discover something of their motions and relations, whereby to ascertain some of their phenomena or causes.

EXPERIMENTAL PHILOSOPHY,

IS that which has its foundation in experience, wherein nothing is assumed as a truth but what is founded upon ocular demonstration, or which cannot be denied without violating the common sense and perceptions of all mankind.

In former times philosophers, when reasoning about natural things, instead of following this method, assumed such principles as they imagined sufficient for explaining the phenomena, without considering whether these principles were just or not. Hence for a great

Expectants
||
Experiment.

great number of ages no progress was made in science; but systems were heaped upon systems, having neither consistency with one another nor with themselves. No proper explanations indeed were given of any thing; for all these systems, when narrowly examined, were found to consist merely in changes of words, which were often very absurd and barbarous. The first who deviated from this method of philosophising, if we may call it by that name, was Friar Bacon, who lived in the 16th century, and who spent 2000 l. (an immense sum in those days) in making experiments. The admirable Crichton, who flourished about the year 1580, not only disputed against the philosophy of Aristotle, which had for so long been in vogue, but wrote a book against it. Cotemporary with this celebrated personage was Francis Bacon lord chancellor of England, who is looked upon to be the founder of the present mode of philosophising by experiments. But though others might lay the foundation, Sir Isaac Newton is justly allowed to have brought this kind of philosophy to perfection; and to him we are certainly indebted for the greatest part of it. Unfortunately, however, neither Lord Bacon nor Sir Isaac Newton had an opportunity of knowing many important facts relating to the principles of fire and electricity, which have since been brought to light. Hence all their philosophy was merely mechanical, or derived from the visible operations of solid bodies, or of the grosser fluids upon one another. In such cases therefore, where the more subtle and active fluids were concerned, they fell into mistakes, or were obliged to deny the existence of the principles altogether, and to make use of terms which were equally unintelligible and incapable of conveying any information with those of their predecessors. A remarkable instance of the errors into which they were thus betrayed, we have in the doctrine of projectiles, where the most enormous deviations from truth were sanctified by the greatest names of the last century, merely by reasoning from the resistance of the air to bodies moving slowly and visibly, to its resistance to the same bodies when moved with high degrees of velocity*. In other cases they were reduced to make use of words to express immaterial powers, as attraction, repulsion, rarefaction, &c. which have since tended in no small degree to embarrass and confound science by the disputes that have taken place concerning them. The foundations of the present system of experimental philosophy are as follow.

I. All the material substances of which the universe is composed are called *natural bodies*. What we perceive uniform and invariable in these substances we call their *properties*. Some of these are general and common to all matter, as extension; others are proper to particular substances, for instance fluidity; while some appear to be compounded of the general and particular properties, and thus belong to a still smaller number; as the properties of air, which are derived from the general property of extension combined with those of fluidity, elasticity, &c.

II. In taking a particular review of the properties of bodies, we naturally begin with that of *extension*. This manifests itself by the three dimensions of length, breadth, and thickness. Hence proceeds the divisibility of matter; which the present system supposes to reach even to infinity: but though this proposition be

supported by mathematical demonstrations, it is impossible we can either have any distinct idea of it, or of the opposite doctrine, which teaches that matter is composed of excessively minute particles called *atoms*, which cannot be divided into smaller ones. The subtilty indeed to which solid bodies may be reduced by mechanical means is very surprising; and in some cases is so great, that we might be tempted to suppose that a farther division is impossible. Thus, in grinding a speculum, the inequalities of its surface are so effectually worn off, that the whole becomes in a certain degree invisible, showing not itself by the light which falls upon it, but the image of other bodies; but the smallest scratch which disturbs the equality of the surface is at once distinctly visible.

III. From the arrangement of these ultimate particles of matter, whatever we suppose them to be, arise the various figures of bodies; and hence figure is a property of all bodies no less universal than extension, unless we choose to speak of the ultimate particles of matter, which, as they are supposed to be destitute of parts, must consequently be equally destitute of figure; and the same consequence will follow whether we adopt this supposition or the other. The figures of bodies are so extremely various and dissimilar, that it is impossible to find any two perfectly alike. It is indeed the next thing to impossible to find two in which the dissimilarity may not be perceived by the naked eye; but if any such should be found, the microscope will quickly discover the imbecility of our senses in this respect. Solidity is another property essential to all matter. By this we mean that property which one quantity of matter has of excluding any other from the space which itself occupies at that time. Hence arises what we call *resistance*, which is always an indication of solidity; and no less so in those bodies which we call *fluid* than in those which are the most solid. This may at first seem to be a contradiction; but fluids yield only when they can get away from the pressure; in all other cases they resist as violently as the most solid bodies. Thus water confined in a tube will as effectually resist the impression of a piston thrust down upon it as though it were the most solid substance. Air indeed will yield for a certain time; but this, as appears from several experiments, is entirely owing to a more subtle fluid, viz. that of elementary fire being pressed out from among its particles. As long as this fluid can be forced out, either from among the particles of air, water, or any other more gross fluid substance, the latter will be found compressible, as a heap of wet sand would be by squeezing the water out from it: but when we come to the most subtle of all elements, such as we suppose that of fire to be, there cannot be any possibility of compressing it, even though we had a vessel so close as to prevent it from escaping through its sides; because its parts are already as near each other as they can be.

IV. The distance of the parts of bodies from each other is what we call their porosity, and was formerly supposed to be owing to a vacuum interpersed between them; but now it is generally allowed that the pores of solid bodies as well as of fluids are filled with an extremely subtle matter which pervades all nature. The porosity of bodies with regard to one another may be thus explained. Wood, or a sponge, is porous with regard

regard to water; but water itself is porous with regard to air, which it absorbs in considerable quantity. Both air and water are porous with regard to the element of fire, which produces very considerable changes upon them, according to the quantity of it they contain, or the manner it acts in their pores. This element itself, however, is not porous with regard to any other substance. Its pores, therefore, if it has any, must be absolute vacuities destitute of any matter whatever. Vacuities of this kind indeed are supposed to be absolutely necessary to motion: for though we may say, matter being divisible almost *ad infinitum*, that a body or substance more solid may move in another substance that is more subtle, and that will give way to its motion, we must nevertheless have recourse to a last resort, and admit of an ultimate vacuum, which will give room sufficient to the least corpuscle, that its part *A* may take the place of its part *B* without the least resistance: besides, it is not to be imagined, that nature, in fact, admits of that infinite divisibility which our imagination can conceive, and that every thing which is possible in idea, is at all times practicable. All that exists is possible, but all that is possible does not however exist. By density, is understood the proportion between the extension and solidity of a body: one body therefore is more dense than another, when, under the same degree of extension, it contains more solid matter: and this quality arises from condensation and compression. Elasticity is nothing more than that effort by which certain bodies, when compressed, endeavour to restore themselves to their former state; and this property supposes them compressible. As all these natural properties of bodies are of great utility in explaining the principles of physics, and in applying them to all the arts, experimental philosophy proves their reality by a thousand examples.

V. We discover still other properties in bodies; such as mobility, which we must not here confound with motion. This mobility arises from certain dispositions which are not in an equal degree in all bodies: from whence it comes that some are more easily moved than others: and this proceeds from the resistance to motion which is perceived in all bodies, having regard merely to their masses; and this resistance is called *vis inertiae*, or *inert force*. A body is said to be in motion when it is actually moving from one place to another; or, whenever a body changes its situation with regard to the objects that surround it, either nearly or remotely, it is said to be in motion. There are three principal matters to be considered in a moving body; its direction, its velocity, and the quantity of its motion: and here physics explains the force or moving power; it likewise distinguishes between simple and compound motion. Simple motion is that which arises from only one force, or which tends to only one point. It describes the laws, and explains the resistance, of mediums; the resistance of friction; the difficulties of a perpetual motion; the alteration of direction occasioned by the opposition of a fluid matter; reflected or reverberated motion; the communication of motion by the shock of bodies, &c. Compound motion is that of a body impelled to move by several causes or powers which act according to their different directions. Physics here likewise investigates the laws of motion; and is particularly applied to the explaining, under this

No 122.

head, what are called the *central forces*, which produce a motion that is either circular or in a curve line, and which incessantly urge the moving body either to approach or recede from the centre. To distinguish these from each other, the former is called the *centripetal force*, and the latter the *centrifugal force*.

VI. By gravity, or ponderosity, is to be understood that force which occasions bodies to pass from a higher to a lower place, when nothing opposes their course, or when the obstacles are not sufficient to stop them. Speculative philosophy investigates its cause, and perhaps in vain. Experimental philosophy contents itself with describing the phenomena, and teaching the laws of gravity, which are thoroughly established by a thousand reiterated experiments. In order properly to understand this subject, we must take care not to confound the term *gravity* with that of *weight*. By the former, we understand that force which urges bodies to descend through a certain space in a given time. By the latter, is meant the quantity of a heavy body that is contained under the same bulk. The phenomena are explained by the experiments themselves, and by inferences deduced from them.

VII. Hydrostatics is a science of which the object is the gravity and equilibrium of fluids in particular. Though the gravity of these bodies is the same with that of others, and is subject to the same laws, yet their state of fluidity gives rise to particular phenomena, which it is of consequence to know. But as hydrostatics cannot be successfully treated on without the assistance of calculation, it has been ranked among the mathematical sciences.

VIII. We say the same with regard to mechanics; which is the art of employing, by the aid of machines, the motion of bodies, in conformity to its properties and laws, as well with regard to solids as fluids, either more commodiously or more advantageously.

IX. After it has made the most accurate experiments, and the most judicious observations, on all these different subjects, and the properties of bodies in particular, Experimental Philosophy passes to the examination of the air, the water, fire, the wind, colours, &c. The air is a fluid with which we are surrounded from the instant of our birth, and without which we cannot exist. It is by the properties and the influences of the air, that nature gives increase and perfection to all that it produces for our wants and conveniences; it is the spirit of navigation: sound, voice, speech itself, are nothing more than percussions of the air: this globe that we inhabit is completely surrounded by air; and this kind of coverture, which is commonly called the *atmosphere*, has such remarkable functions, that it evidently appears to concur to the mechanism of nature. Experimental physics, therefore, considers the air, 1. Of itself, independent of its bulk, and the figure of its whole body: it examines its essential properties; as its gravity, density, spring, &c. The air-pump is here of indispensable use; and by this machine physics examines in what manner space, or a vacuum, is made. It likewise shows the necessity of air to the preservation of animal life; the effect it has on sound, fire, and gunpowder, *in vacuo*; and a hundred other experiments of various degrees of curiosity. 2. It considers the air as the terrestrial atmosphere, sometimes as a fluid at rest, and sometimes as in motion.

And

And by these means it accounts for the variation of the mercury in the barometer, and why it sinks in proportion as the height of the atmosphere diminishes; as also for the figure, the extent, and weight of the atmosphere: it shows the method of determining the height of mountains, the nature of sound in general, of its propagation, and of sonorous bodies. The late discoveries of Dr Priestley and others have added a new and very considerable branch to experimental philosophy in this respect, of which an account is given under the article *AEROLOGY*.

X. It is here also, that experimental philosophy considers the nature of the wind; which is nothing more than agitated air, a portion of the atmosphere that moves like a current, with a certain velocity and determinate direction. This fluid, with regard to its direction, takes different names according to the different points of the horizon from whence it comes, as east, west, north, and south. Winds are likewise distinguished into three sorts; one of which is called *general* or *constant*, as the trade-winds which continually blow between the tropics: another is the *periodical*, which always begin and end within a certain time of the year, or a certain hour of the day, as the monsoons, the land-breezes and sea-breezes, which arise constantly in the morning and evening; and lastly, such as are *variable*, as well with regard to their direction as their velocity and duration.

M. Mariotte computes the velocity of the most impetuous wind to be at the rate of 32 feet in a second, and Mr Derham makes it 66 feet in the same time. The first, doubtless, meant the wind of the greatest velocity that had then come to his knowledge. The invention of aerostatic machines has tended more to show the real velocity of the wind than any other invention as yet made public: but all of them move slower than the aerial current; so that the real velocity of the wind remains yet undetermined.

XI. The force of the wind, like that of other bodies, depends on its velocity and mass; that is, the quantity of air which is in motion: so the same wind has more or less force on any obstacle that opposes it, in proportion as that obstacle presents a greater or a less surface: for which reason it is that they spread the sails of a vessel more or less, and place the wings of a wind-mill in different directions. The machines by which the winds are measured, are called *anemometers*. They show the direction, the velocity, and the duration of winds. It is by the agitations of the wind that the air is purified; that the seeds of trees and herbs are conveyed through the forests and fields; that ships are driven from one pole to the other; that our mills turn upon their axes, &c.; and art, by imitating nature, sometimes procures us artificial winds, by which we refresh our bodies, invigorate our fires, purify our corn, &c.

XII. Water is an universal agent, which nature employs in all her productions. It may be considered as in three states, 1. As a liquid; 2. As a vapour; 3. As ice. These three different states do not in any manner change its essence, but make it proper to answer different ends. The natural state of water would be that of a solid body, as fat, wax, and all those other bodies which are only fluid when heated to a certain degree: for water would be constantly ice, if the particles of fire, by which it is penetrated in the tempe-

rate climates, did not render it fluid, by producing a reciprocal motion among its parts; and, in a country where the cold is continually strong enough to maintain the congelation, the assistance of art is necessary to make it fluid in the same manner as we do lead, &c. Water, when not in ice, is a fluid that is insipid, transparent, without colour, and without smell, and that easily adheres to the surface of some bodies, that penetrates many, and extinguishes fire. Experimental philosophy investigates the origin of fountains; the cause of the saltiness of the sea; the means of purifying water; what is its weight, and what are its effects when heated, &c. It likewise examines this fluid in the state of vapour; and finds that a drop of water, when in vapour, occupies a space vastly greater than it did before. It explains the *æolipile* and its effects; fire engines; and the force of vapours that give motion to immense machines in mines and elsewhere, &c. and lastly, it considers water in the state of ice. Ice consequently is more cold than water; and its coldness increases if it continue to lose that matter, already too rare, or too little active, to render it fluid. Experimental physics endeavours to investigate the causes of the congelation of water, and why ice is lighter than water; from whence it derives that expansive force by which it breaks the containing vessel; the difference there is between the congelation of rivers and that of standing waters; why ice becomes more cold by the mixture of salts; and many other similar phenomena.

XIII. The nature of fire is yet very much unknown to the most learned philosophers. As objects when at a great distance are not perceptible to our senses, so when we examine them too nearly, we discern them but confusedly. It is still disputed whether fire be a homogeneous, unalterable matter, designed, by its presence, or by its action, to produce heat, inflammation, and dissolution, in bodies; or if its essence consists in motion only, or in the fermentation of those particles which we call *inflammable*, and which enter as principles, in greater or less quantities, in the composition of mixed bodies. The most learned inquirers into nature incline to the former opinion; and to have recourse to a matter which they regard as the principle of fire. They suppose that there is in nature a fluid adapted to this purpose, created such from the beginning, and that nothing more is necessary than to put it in action. The numberless experiments which are daily made in electricity seem to favour this opinion, and to prove that this matter, this fluid, this elementary fire, is diffused through all nature, and in all bodies, even ice itself. We cannot say to what important knowledge this great discovery of electricity may lead if we continue our inquiries concerning it. It appears, however, that we may believe, without any inconvenience or absurdity, that fire and light, considered in their first principle, are one and the same substance differently modified.

XIV. Be this matter however as it may, experimental philosophy is employed in making the most ingenious and most useful researches concerning the nature of fire, its propagation, and the means by which its power may be excited or augmented; concerning the phosphorus and its inflammation; fire excited by the reflection of the sun's rays from a mirror; and on the effects of fire in general; concerning lightning and its effects; the fusion of metals; gunpowder and its explosion;

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explosion;

explosion; flame and the aliments of fire; and an infinity of like objects which it explains, or concerning which it makes new discoveries, by the aid of experiments.

XV. By the word *light*, we understand that agent by which nature affects the eye with that lively and almost constantly pleasing sensation, which we call *seeing*, and by which we discern the size, figure, colour, and situation of objects, when at a convenient distance. All philosophers agree, that the light, which is diffused in any place, is a real body. But what this body is, and by what means it enters that place where it is perceived, is a question about which philosophers are divided.

XVI. Experimental philosophy is applied in discovering or proving, by an infinity of experiments, what is the nature of light, in what manner it is propagated, what its velocity and progressive motion. It also investigates and explains the principles of *optics* properly so called, and shows the directions which light observes in its motions. From thence it proceeds to the examen of the principles of *catoptrics*, and describes the laws and effects of reflected light. It next treats of the principles of *dioptrics*, and explains the laws of refracted light; and lastly, it teaches, from the principles of natural and artificial vision, the construction of optical instruments, as lenses, concave mirrors, prisms, telescopes, &c. &c. and the uses to which they are applied.

XVII. By resolving or separating the rays of light, philosophy has obtained true and clear discoveries of the nature of colours. We are naturally led to imagine that colours, and their different degrees, make a part of the bodies that present them to our sight; that white is

inherent in snow, green in leaves and grass, and red in a stuff dyed of that colour. But this is far from being true. If an object, which presents any colour to our sight, be not illuminated, it presents no colour whatsoever. In the night all is black. Colours therefore depend on light; for without that we could form no idea of them: but they depend also on bodies; for of several objects presented to the same light, some appear white, others red, blue, &c. But all these matters being separate from our own bodies, we should never acquire any ideas of them, if the light, transmitted or reflected by these objects, did not make them sensible to us, by striking upon the organs of our sight, and if these impressions did not revive in us those ideas which we have been used to express by certain terms. For these reasons philosophy considers colours from three points of view, 1. As in the light; 2. In bodies, as being coloured; and, 3. From the relation they have to our visual faculties, which they particularly affect, and by which we are enabled to distinguish them.

It is unnecessary in this place to say more either on colour in particular or experimental philosophy in general. The different subjects of this collective article are particularly treated under their proper names, in the order of the alphabet: the reader will therefore turn, as he has occasion, to ACOUSTICS, CATOPTICS, CHROMATICS, DIOPTRICS, HYDROSTATICS, MECHANICS, OPTICS, PNEUMATICS, ELECTRICITY, MAGNETISM, &c. &c. &c. Also AEROLOGY, AEROSTATION, ATMOSPHERE, *Burning-Glass*, COLD, COLOUR, CONGELATION, EVAPORATION, FIRE, FLAME, FLUIDITY, HEAT, IGNITION, LIGHT, SOUND, STEAM, WATER, WIND, &c.

E X P

Experimentum
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Expiation.

EXPERIMENTUM CRUCIS, a capital, leading, or decisive experiment; thus termed, either on account of its being like a cross, or direction-post placed in the meeting of several roads, guiding men to the true knowledge of the nature of that thing they are inquiring after; or, on account of its being a kind of torture, whereby the nature of the thing is as it were extorted by force.

EXPHORESIS. See ORATORY, n° 85.

EXPIATION, a religious act, by which satisfaction or atonement is made for the commission of some crime, the guilt done away, and the obligation to punishment cancelled.

Expiations among the Heathens, were of several kinds; as sacrifices and religious washings. They were used for effacing a crime, averting any calamity, and on numberless other occasions, as purifying towns, temples, and sacred places, and armies before and after battle. And they were performed for whole cities as well as particular persons.

The method of expiation among the Jews was chiefly by sacrifice, whether for sins of ignorance, or to purify themselves from certain pollutions.

Feast of Expiation among the Jews, called by our translators the *day of atonement*, was held on the tenth day of Tisri, or the seventh month of the Jewish year, answering to part of our September and October. It

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was instituted by God himself, Levit. xxiii. 27, &c. On that day the high-priest, the figure or type of Jesus Christ, entered into the most holy place, and confessed his sins; and, after several ceremonies, made an atonement for all the people to wash them from their sins. Lev. chap. xvi. See *SCAPE-GOAT*.

EXPIATION, in a figurative sense, is applied by divines to the pardon procured to the sins of the penitent by the merit of Christ's death. See the article CHRISTIANITY.

EXPIRATION, in medicine. See EXPIRATION.

EXPIRATION, is also used figuratively, for the end of a term of time granted, agreed on, or adjudged.

EXPLICIT, in the schools, something clear, distinct, formal, and unfolded.

EXPLOSION, in natural philosophy, a sudden and violent expansion of an aerial or other elastic fluid, by which it instantly throws off any obstacle that happens to be in the way, sometimes with incredible force, and in such a manner as to produce the most astonishing effects upon the neighbouring objects.

Explosion differs from expansion, in that the latter is a gradual and continued power, acting uniformly for some time; whereas the former is always sudden, and only of momentary duration. The expansions of solid substances do not terminate in violent explosions, on account of their slowness, and the small space through which

Expiation
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Explosion

Difference
between
explosion
expansion

Explosion. which the metal, or other expanding substance, moves; though their strength may be equally great with that of the most active aerial fluids. Thus we find, that though wedges of wood, when wetted, will cleave solid blocks of stone, they never throw them to any distance, as is the case with gun-powder. On the other hand, it is seldom that the expansion of any elastic fluid bursts a solid substance without throwing the fragments of it to a considerable distance, the effects of which are often very terrible. The reasons of this may be comprised in the two following particulars: 1. The immense velocity with which the aerial fluids expand, when affected by a considerable degree of heat; and, 2. Their celerity in acquiring heat and being affected by it, which is much superior to that of solid substances. Thus air, heated as much as iron when brought to a white heat, is expanded to four times its bulk; but the metal itself will not be expanded the 500th part of the space. In the case of gun-powder, which is a violent and well-known explosive substance, the velocity with which the flame moves is calculated by Mr Robins, in his Treatise upon Gunnery, to be no less than 7000 feet in a second, or little less than 79 miles per minute. Hence the impulse of the fluid is inconceivably great, and the obstacles on which it strikes are hurried off with vast velocity, though much less than that just mentioned; for a cannon bullet, with the greatest charge of powder that can be conveniently given, does not move at a greater rate than 2400 feet per second, or little more than 27 miles per minute. The velocity of the bullet again is promoted by the sudden propagation of the heat through the whole body of air as soon as it is extricated from the materials of which the gunpowder is made; so that it is enabled to strike all at once, and thus greatly to augment the momentum of the ball. It is evident that this contributes very much to the force of the explosion by what happens when powder is wetted or mixed with any substance, which prevents it from taking fire all at once. In this case the force of the explosion, even when the same quantity of powder is made use of, cannot be compared to that of dry powder.

Upon these principles we may conclude, that the force of an explosion depends, 1. On the quantity of elastic fluid to be expanded; 2. On the velocity it acquires by a certain degree of heat; and, 3. On the celerity with which the degree of heat affects the whole of the expansile fluid. These three take place in the greatest perfection where the electric fluid is concerned; as in cases of lightning, earthquakes, and volcanoes. This fluid, as is shown in many parts of this work, differs not from elementary fire or the light of the sun; it pervades the whole system of nature; its expansion is nothing else than its motion from a centre towards a circumference, for it does not seem capable of any proper expansion by a separation of its parts like any other fluid. Hence, when it begins to expand in this manner, the motion is propagated through it with a velocity far exceeding that of any other fluid whatever. Thus, even when the quantity is excessively small, as when an electric spark is sent through a glass full of water or of oil, the expansion is so violent as to dissipate the glass into innumerable fragments with great danger to the by-standers, as is observed under the article *ELECTRICITY*. In violent lightning, where

the electric fluid collects itself into balls, the strength of the explosion is proportionable to the quantity. Every one has heard of the prodigious effects of lightning when it happens to strike buildings, trees, or even the most solid rocks; and in some cases, where the quantity of electricity is still greater than in any flash of lightning, we hear of still more tremendous consequences ensuing. Dr Priestley gives an instance of a large fire-ball (undoubtedly a quantity of electric matter) rolling on the surface of the sea, which after rising up to the top-mast of a ship of war, burst with such violence that the explosion resembled the discharge of hundreds of cannon fired at once. Great damage was done by it; but there is not the least doubt that most of its force was spent on the air, or carried down to the sea by the mast and iron-work of the ship. Indeed, considering that in all cases a great part of the force of electric explosions is dissipated in this manner, it may justly be doubted whether they can be measured by any method applicable to the mensuration of other forces. Even in artificial electricity the force is prodigiously great; insomuch that Dr Van Marum calculated that of the great battery belonging to the machine in Teyler's museum to be upwards of 900 pounds.

In those cases where the electrical matter acts like Volcanic⁴ common fire, the force of the explosions, though exceedingly great, is capable of mensuration by comparing the distances to which the bodies are thrown with their weight. This is most evident in volcanoes, where the projections of the burning rocks and lava manifest the greatness of the power, at the same time that they afford a method of measuring it. These explosions, as is shown under the article *VOLCANO*, are owing to extrication of aerial vapours, and their rarefaction by intense heat. In all of them the air is originally in a state of decomposition, viz. its invisible and solid part⁵ is joined with some terrestrial substance. Thus, when fixed air, for instance, is exposed to any pure earth which attracts it, as calcined magnesia, a decomposition instantly takes place. All these vapours⁶ are composed of elementary fire and some invisible substance capable of assuming a solid form. The decomposition just mentioned is therefore easily explained; the solid part of the air joins itself to the magnesia, while the elementary fire or latent heat is dissipated, and passes thro' the sides of the vessel. Were it now in our power suddenly to restore the latent heat to the whole of the fixed air, so that it would at once assume its former expansion, a violent explosion would follow. This seems to be precisely the case with the volcanic explosions. An immense quantity of the fixed part of different aerial fluids is united to the various substances found below the surface of the earth. By means of the electric fire which kindles the volcanoes, the aerial fluids are suddenly restored to their elastic state; and not only so, but their natural elasticity is greatly augmented, so that the explosions take place with great violence. The case is the same with gunpowder; only that the condensed air⁷ in this case is at first of the dephlogisticated kind, but is quickly phlogisticated by reason of the combustible matters mixed with the nitre, while the heat produced by the inflammation augments the elasticity of the generated air to four times what it usually is, so that the whole force of the explosion is calculated at 1000 times

Explosion.

* See the article *Gunnery*.7
Of pulvis fulminans, &c.8
Explosions by aqueous vapours.9
Violent explosion of water with melted copper.10
Probably owing to a decomposition of the water.11
Particularly explained.

times the pressure of the common atmosphere *. Thus the explosions of gunpowder and of volcanoes are essentially the same. The reason of the extreme quickness of those of gunpowder is, that it takes fire so readily by the intimate mixture and combustibility of all the materials. In volcanoes the explosions likewise follow one another very quickly, and are by no means inferior in strength to those of gunpowder: but here the quantity of vapour makes up for the comparative slowness with which it is affected by the heat. Thus, though we could not by any means contrive to fire cannon in quick succession by means of calcareous earth as we can do with gunpowder, yet in the huge furnace of a volcano the elastic matter is supplied in such quantities, that the explosions are in a manner unremitting; and even in ordinary experiments the confinement of aerial vapours has often occasioned violent explosions in chemical vessels. In one case too the extrication of fixed air adds excessively to the force of an explosion, viz. in that of pulvis fulminans. This is compounded of sulphur, saltpetre, and salt of tartar. The latter we know contains much fixed air; and it is probable that the violence of the explosion is occasioned by this air; for the greater quantity of it that the alkaline salt contains, the greater force does it explode with. Fulminating gold emits a quantity of phlogisticated air, to which its explosive power is supposed to be owing, as is explained under the article *CHEMISTRY*; but that of fulminating silver is so extraordinary, that scarce any force of aerial vapour that can be extricated is likely to produce it, and it seems probable that electricity itself is concerned.

Next in strength to the aerial vapours are those of aqueous and other liquids. The most remarkable effects of these are observed in steam-engines; but there is one particular case from which it has been inferred that aqueous steam is vastly stronger than the flame of gunpowder. This is when water is thrown upon melted copper: for here the explosion is so strong as almost to exceed imagination; and the most terrible accidents have been known to happen from such a slight cause as one of the workmen spitting in the furnace where copper was melting. Here, however, it is most probable that a decomposition of the water takes place. That this element can be decomposed or resolved into an aerial and a solid substance, is extremely probable from the experiments of Dr Priestley, as well as those of the French philosophers. The position is indeed denied by the phlogistians; but their arguments appear not to be conclusive; nor is it a fact which militates in the least against their principles. On the supposition that the water is decomposed in the present case, however, the phenomenon in question is easily solved. The water being thrown in substance upon the melted copper, is decomposed by the violent heat; and one part of it adheres to the metal, thus converting it into a kind of calx, while the other is converted into inflammable or some other kind of air, which expanding suddenly, throws the melted metal all about with the greatest violence by means of its re-action.

To understand the manner in which this is accomplished, we must consider some of the principles of *GUNNERY* laid down by Mr Robins, and related under that article. One of these is, that though the air, in cases of ordinary velocity, makes no great re-

sistance, it is far otherwise where the velocity of the moving body becomes very great. In all cases of explosion also there is in the first instance a vacuum made by the exploding fluid; and consequently the weight of the atmosphere is to be overcome, which amounts to about 15 pounds on every square inch of surface. Supposing the surface of the exploding fluid, then, on that of melted copper, to contain an area of 4 square inches, it meets with a resistance of 60 pounds from the atmosphere, and consequently communicates an equal pressure to the fluid metal. Even this must of consequence throw it about, unless the same pressure was exactly diffused over every part of the surface: But much more must this effect be increased by the immense velocity with which the fluid moves, and by which the resistance of the atmosphere is augmented in a prodigious degree, as is explained under the article *GUNNERY*. The elastic fluid generated is then confined not only by the fluid metal and sides of the furnace, but by the air itself, which cannot get out of the way; so that the whole resembles a cannon closed at the mouth, and filled with inflamed gunpowder. Hence not only the melted metal, but the furnace itself and the adjacent walls of the building, are hurried off as they would be by the firing of a great quantity of gunpowder in a small space, and which is well known to produce analogous effects.

In explaining the phenomenon in question, Dr Black is not owing to moisture. He supposes that the mere heat of the metal applied to the aqueous steam produces the explosion; and in proof of this alleges, that copper imbibes a greater quantity of heat during fusion than any other metal. Aqueous steam, however, seems to be too slow for producing such sudden and violent effects. Explosions, it is true, will be occasioned by it, but then it must be confined for a very considerable time; whereas the effects of water thrown upon melted copper are instantaneous.

It may now be asked, Why such explosions do not take place with any other metal, iron for instance, when water is thrown upon its surface in fusion? In answer to this we must observe, That though water is decomposed by being applied to red-hot iron in the form of steam, yet there is a possibility, that when the same element is applied in substance to the fluid metal, no decomposition may ensue. Something like this indeed happens with copper itself; for, notwithstanding the violent effects which take place on the contact of water in substance with the melted metal, no explosion happens though aqueous steam be blown upon its surface. On the contrary, the upper part of the metal is thus cooled, and forms itself into cakes, which are afterwards taken off, and new ones formed in the same manner; neither does aqueous steam affect red-hot copper in the manner that it does iron in the same state. A decisive proof that the explosion is not occasioned by the mere heat of the aqueous steam may be deduced from the example of melted glass, which produces no explosion though we pour water upon it in that state; and yet the heat of melted glass is undoubtedly equal at least to that of melted copper. It must be observed, however, that in all cases where a very hot body is thrown upon a small quantity of water in substance, an explosion will follow; but here the water is confined and suddenly rarefied into steam, which cannot get away without throwing off the body which confines it.

Explosion.

12
Is not owing to moisture.13
Why such explosions do not take place with other metals.14
Explosion when heat is thrown upon small quantities of water.

Explosion. confines it. Examples of this kind frequently occur where masons or other mechanics are employed in fastening cramps of iron into stones; where, if there happens to be a little water in the hole into which the lead is poured, the latter will fly out in such a manner as sometimes to burn them severely. Terrible accidents of this kind have sometimes happened in foundries, when large quantities of melted metal have been poured into wet moulds. In these cases, the sudden expansion of the aqueous steam has thrown out the metal with violence; and if any decomposition has taken place at the same time, so as to convert the aqueous into an aerial vapour, the explosion must be still greater.

¹⁵ By pouring cold water into boiling oil. To this last kind of explosion we must refer that which takes place on pouring cold water into boiling or burning oil or tallow. Here the case is much the same whether we pour the oil on the water, or the water on the oil. In the former case, the water which lies at the bottom is rarefied into steam and explodes; in the latter, it sinks down through the oil by its superior specific gravity, and explodes as it passes along. In either case, however, the quantity of aqueous fluid must be but small in proportion to that of the oil: a very great quantity would put out the flame, or destroy the heat, in whatever way we applied it.

¹⁶ Explosions in solid substances explained. Another kind of explosion is that which takes place in solid substances, where we can scarce suppose either aqueous or aerial vapours to be concerned. The most remarkable of these are the *volcanic bombs* mentioned by Sir William Hamilton in the great eruption of Vesuvius in 1779. They were large pieces of lava which burst in pieces like bombs as they fell to the ground; but he does not inform us whether their bursting was attended with any great violence or not. Indeed, amidst such scenes of horror, and the continual tremendous explosions of the volcano, smaller phenomena of this kind would probably be overlooked. Other examples are the *Glass-Tears*, of which an account is given under that article; the bursting of electrical globes, when put in motion; of other glass-vessels spontaneously, and seemingly without any cause; and lastly, the bursting of large cast-metal vessels in the act of cooling. These are all so similar to one another, that it is probable they depend on one general cause. All of them agree in this respect, that the extreme parts of them are considerably cooled, while the internal remain very hot. Thus, in the volcanic bombs, the current of air, formed by their swift passage through it in falling, necessarily carries off a great quantity of heat from the parts which are in contact with it, while the rest are scarce at all cooled. The glass-tears are artificially cooled on the outside by dropping them upon water; and in consequence of this, their explosion is probably more violent in proportion to their bulk than that of the volcanic bombs. Glass-vessels only burst spontaneously when they have not been well annealed; and we know that this bad annealing consists only in applying cold too suddenly to the outside. Something like this probably takes place when cast-iron vessels explode; and we are certain it does so with electrical globes, for these last are not apt to burst if they have been well annealed. In all cases, therefore, there is a remarkable contraction of the outward surface by the cold, while the internal parts remain as much expanded as ever. In this case there must be a continual ef-

fort of that subtle fluid called *elementary fire*, from the internal to the external part, as the contraction gradually proceeds the contrary way. Thus, when a volcanic bomb, for instance, is cooled on the outside, its parts are consolidated so that the internal fluid has not such an easy passage through it as is necessary. In consequence of this it makes a greater effort, which is still farther augmented by the cooling and contraction of the internal parts squeezing the fluid out from among themselves, and forcing it to recoil upon that in the centre, as well as to exert itself against the external part; from which united operation the effect already mentioned at last takes place. This explanation, however, does not hold with respect to electrical globes, glass-tears, or ill-annealed glass: but in order to accommodate it to all these, we have only to remember, that *fire*, and the electric fluid acting from a centre to a circumference, are not in the least different; so that from whatever cause the electric matter is disposed to act in this manner, the same effect will follow, *i.e.* an explosion will take place if the substance does not afford an equally ready passage through all its parts, and that whether any sensible heat is felt in it or not.

The only other kind of explosion we have to take notice of is that produced by inflammable and dephlogisticated air, when mixed together and set on fire. This differs from any of those hitherto considered, because in reality there is an absolute condensation rather than an expansion throughout the whole of the operation; and could the air be made to take fire throughout their whole substance absolutely at the same instant, there would be no explosion, but only a sudden production of heat. From this cause also is derived a very singular phenomenon taken notice of by Dr Priestley in his late experiments on that subject, recorded in the Phil. Trans. Having inclosed several quantities of inflammable and dephlogisticated air in a copper vessel, firing them afterwards by the electric sparks, he found that the force of the explosion was directed more towards one part of the vessel than another; least on that part where the electrical discharge was made, and most upon that which was farthest from it. This inequality was very considerable; insomuch that he could not repeat his experiments any number of times without injuring the vessel in that part which was farthest from the discharge. The reason he gives for this is, that the mixture was not fired at the same instant, but first at the place where the discharge was made. This first explosion would have acted equally upon all parts of the vessel, had it not been for the intervention of the air. By the first momentary explosion, however, the air in the farthest part of the vessel was condensed, so that the next explosion was made stronger, while the copper in the fore-part of the vessel had the whole of this strong explosion to resist, the hinder part being but little concerned, as the air in it was condensed and reduced almost to a vacuum.

Though the phenomena of explosions are sometimes very destructive, they are likewise of considerable use in life; by removing obstacles which could scarcely be got the better of by any mechanical power whatever. The principal of these are the blowing up of rocks, the separating of stones in quarries, and other purposes of that

¹⁷ Explosion of inflammable and dephlogisticated air.

¹⁸ Singular phenomenon observed by Dr Priestley.

¹⁹ Uses to which explosions are applied.

Explosion.

20
Attempts
to supersede
the use of
gunpow-
der.

that kind. The destruction occasioned by them in times of war, and the machines formed upon the principle of explosion for the destruction of the human race, are well known; and if we cannot call these *useful*, we must allow them at least to be necessary evils. For the production of explosions, gunpowder is the only substance that has yet been found to answer; nevertheless, as its use is attended with considerable expence, several attempts have been made to find out a cheap substitute for it. One of the most remarkable of these was by mixing small quantities of water inclosed in little bladders or some easily destructible vehicles along with a charge of powder. By this contrivance it was hoped, that the water being converted into vapour when the powder was inflamed, would augment the force of the explosion: but instead of this, it was found greatly to diminish it. The reason was evident, viz. that the conversion of the water into steam required so much of the latent heat of the inflamed gunpowder, that enough was not left to give the necessary expansion to the aerial fluid produced. A mixture of inflammable and dephlogisticated air has also been tried; but the explosion here has always been found too weak. In mines, indeed, very terrible effects are produced by such a mixture, but in these the quantity is immense; so that the comparative weakness of the mixture cannot be discovered. Electricity therefore seems to be the only resource we have; except by adding ingredients to gunpowder which may increase the strength of it. There can be no doubt indeed that the electric fluid is possessed of sufficient strength to perform every thing we could desire; and electricians have supposed, perhaps justly enough, that a cannon charged with water might, by means of electricity, become more dangerous than one charged with gunpowder: but this fluid is so exceedingly capricious, so imperceptible and unmanageable, that the use of it cannot as yet be thought practicable, nor in all probability ever will be so.

21
Effects of
explosions
on the at-
mosphere
and elec-
tric fluid.

The effects of explosions, when violent, are felt at a considerable distance, by reason of the concussions they give to the atmosphere; for, as has been already hinted, all of them act upon the atmospherical fluid with the very same force they exert upon terrestrial substances subjected to their action. Sir William Hamilton relates, that at the explosions of Vesuvius in 1767, the doors and windows of the houses at Naples flew open if unbolted, and one door was burst open though it had been locked. A great quantity of gunpowder being put into the ditch of a fortified city, and set on fire, destroyed part of the wall, and broke down one of the gates. The blowing up of powder-magazines or powder-mills will destroy buildings and kill people, though certainly without the reach of the flame, and untouched by any part of the shattered magazine or mill. But the most curious effect is, that they electrify the air and even glass-windows at a considerable distance. This is always observable in firing the guns of the Tower at London: and some years ago, after an explosion of some powder-mills in the neighbourhood of that city, a great number of people were alarmed by a rattling and breaking of their china-ware; which by the vulgar was taken for a supernatural phenomenon, but undoubtedly was owing to some commotion in the electrical fluid from the violent concussion of the atmosphere. In this respect, however, the effects of

electrical explosions themselves are most remarkable, though not in the uncommon way just mentioned; but it is certain, that the influence of a flash of lightning is diffused for a great way round the place where the explosion happens, producing many very perceptible changes both on the animal and vegetable creation.

EXPONENT, in algebra, the same with index. See ALGEBRA.

EXPONENT is also used in arithmetic, in the same sense as index or logarithm.

EXPORTATION, the shipping and carrying out of the kingdom wares and commodities for other countries. See the articles COMMERCE, TRADE, and SHIPPING.

EXPOSING, the act of setting a thing to public view. In the Romish church, the sacrament is said to be *exposed* when it is shown in public uncovered on festival days, and during the time of plenary indulgences.

EXPOSING is also used with a farther latitude: thus we say, It is prohibited to expose false and clipped money. Such a house stands very high, and has a delicious prospect; but it is exposed to all the four winds. Such a city being on the frontiers, and not fortified, is exposed to the insults of every party of forces.

EXPOSING of Children, a barbarous custom practised by most of the ancients excepting the Thebans, who had an express law to the contrary, whereby it was made capital to expose children; ordaining at the same time, that such as were not in a condition to educate them should bring them to the magistrates, in order to be brought up at the public expence. Among the other Greeks, when a child was born, it was laid on the ground; and if the father designed to educate his child, he immediately took it up; but if he forbore to do this, the child was carried away and exposed. The Lacedemonians indeed had a different custom: for with them all new-born children were brought before certain triers, who were some of the gravest men in their own tribe, by whom the infants were carefully viewed; and if they were found lusty and well-favoured, they gave orders for their education, and allotted a certain proportion of land for their maintenance; but if weakly or deformed, they ordered them to be cast into a deep cavern in the earth, near the mountain Taygetus, as thinking it neither for the good of the children themselves nor for the public interest, that defective children should be brought up. Many persons exposed their children only because they were not in a condition to educate them, having no intention that they should perish. It was the unhappy fate of daughters especially to be thus treated, as requiring more charges to educate and settle them in the world than sons.

The parents frequently tied jewels and rings to the children they exposed, or any other thing whereby they might afterwards discover them, if Providence took care for their safety. Another design in adorning these infants was either to encourage such as found them to nourish and educate them, if alive; or to give them human burial if dead. The places where it was usual to expose children were such as people frequented most. This was done in order that they might be found, and taken up by compassionate persons who were in circumstances to be at the expence of their education. With this intention the Egyptians and

Exponent
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Exposing.

Exposition
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Extant.

Romans chose the banks of rivers, and the Greeks the highways.

EXPOSITION, in general, denotes the setting a thing open to public view. See **EXPOSING**.

EXPOSITION, in a literary sense, the explaining an author, passage, writing, or the like, and setting their meaning in an obvious and clear light.

EXPOSITOR, or **EXPOSITORY**, a title which some writers have given to a lesser kind of dictionaries or vocabularies, serving to expound or explain the meaning of the obscure or difficult words of a language. It is also used in the same sense with commentary and paraphrase.

EXPOSTULATION, in rhetoric, a warm address to a person who has done another some injury, representing the wrong in the strongest terms, and demanding redress.

EXPOSURE, in gardening, the situation of a garden wall, or the like, with respect to the points of the compass, as south or east. See **GARDENING**.

Ex-post-facto; in law, denotes something done after another thing that was committed before. An estate granted may be made good by matter *ex-post-facto*, that was not so at first by election, &c.

EXPRESSED OILS, in chemistry, such oils as are obtained from bodies only by pressing. See **OIL**.

EXPRESSION, in rhetoric, the elocution, diction, or choice of words in a discourse. See **LANGUAGE**, **ORATORY**, and **POETRY**.

EXPRESSION, in music. See **COMPOSITION**.

EXPRESSION, in painting, a natural and lively representation of the subject, or of the several objects intended to be shown.

The expression consists chiefly in representing the human body and all its parts, in the action suitable to it: in exhibiting in the face the several passions proper to the figures, and observing the motions they impress on the external parts. See **PAINTING**.

EXPRESSION Theatrical. See **DECLAMATION**, article iv.

EXPRESSION, in medicine, chemistry, &c. the act of expressing or extracting the juices or oils of plants, fruits, or other matters, by squeezing, wringing, or pressing them in a press. After having let the herbs infuse a due time, their juice must be drawn by expression in a linen cloth or by a press.

EXPULSION, in a general sense, the act of violently driving a person out of any city, society, &c.

EXPULSION, in medicine, the act whereby any thing is forcibly driven out of the place in which it is: thus we say, the expulsion of the fetus in delivery.

EXSICCATION, (formed of *ex* and *siccus*, "dry,") in chemistry, &c. the act of drying up or evaporating the moisture of a thing.

EXPIRATION, in physics, that part of respiration by which the air is expelled or driven out of the lungs. See **ANATOMY**, n° 118. and **RESPIRATION**.

EXSUDATION, or **EXUDATION** the act of sweating out. In which manner, gums, balsams, &c. are usually produced from trees.

EXTANT, something that still subsists, or is in being. It is but part of the history of Livy, of the writings of Cicero, Cæsar, &c. that are extant, the rest are lost. We have nothing extant of Socrates, though he wrote a great deal.

Extasy
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Extortion.

EXTASY, a transport which suspends the function of the senses, by the intense contemplation of some extraordinary or supernatural object.

EXTASY, in medicine, a species of catalepsy, when a person perfectly remembers, after the paroxysm is over, the ideas he conceived during the time it lasted.

EXTENSION, in philosophy, one of the common and essential properties of body; or that by which it possesses or takes up some part of universal space, which is called the place of that body. See **METAPHYSICS**, n° 56.

EXTENSOR, an appellation given to several muscles, from their extending or stretching the parts to which they belong. See **ANATOMY**, *Table of the Muscles*.

EXTENT, in law, is used in a double sense. Sometimes it signifies a writ or command to the sheriff for the valuing of lands or tenements; and sometimes the act of the sheriff, or other commissioner, upon this writ.

Old and New EXTENT, in Scots law. See **LAW**, N° clxvi. 6.

EXTENUATION, the act of diminishing or lessening the bulk or substance of a thing, especially of the human body. Fevers, agues, long abstinences, &c. occasion great extenuations or emaciations.

EXTENUATION, is also a figure in rhetoric, opposite to the hyperbole. The Greeks call it *λίσσις*.

EXTERIOR, or **EXTERNAL**. See **EXTERNAL**.

EXTERMINATION, in general, the extirpating or destroying something.

EXTERMINATION, or **EXTERMINATING**, in algebra, is used for taking away. Thus algebraists speak of exterminating surds, fractions, and unknown quantities out of equations. See *Maclaur. Algebr. part i. chap. 12.* where we have some general theorems for the exterminating unknown quantities in given equations.

EXTERNAL, a term of relation applied to the surface or outside of a body, or that part which appears or presents itself to the eye, touch, &c. in contradistinction to internal.

EXTERNAL is also used to signify any thing that is without-side a man, or that is not within himself, particularly in his mind; in which sense we say, external objects, &c.

EXTINCTION, in general, denotes the putting out or destroying something, as a fire or flame. See *Extinguishing of FIRE*.

EXTINGUISHMENT, in law, is a consolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchases the lands out of which the rent arises; in this case, both the property and the rent being united in one possessor, the rent is said to be extinguished.

EXTIRPATION, (formed of *ex* and *stirps*, "root") the act of pulling up or destroying a thing to the very roots. Among the prayers of the Romish jubilee, there is one for the extirpation of heresy.

EXTIRPATION is also used, in surgery, for cutting off any part entirely; as a wen, &c. or the eating it away, as a wart, &c. by corrosive medicines.

EXTISPEX, in antiquity, the person who drew prefaces from viewing the intrails of animals offered in sacrifice.

EXTORTION, in law, is an illegal manner of wresting any thing from a man, either by force, menace,

Extract
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Extrava-
gantes.

nace, or authority. It is also the exaction of unlawful usury, winning by unlawful games, and taking more than is due under pretence of right, as excessive tolls in millers, &c.

At the common law, extortion is punishable by fine and imprisonment; and the statute of 3 Eliz. 1. c. 30. has enacted, that officers of justice guilty of extortion for the expedition of business, &c. shall render to the party treble value. There are likewise divers other statutes for punishing extortions of sheriffs, bailiffs, goalers, clerks of the assize and of the peace, attornies, solicitors, &c.

EXTRACT, in pharmacy, is a solution of the purer parts of a mixed body inspissated, by distillation or evaporation, nearly to the consistence of honey.

EXTRACT, in matters of literature, is something copied or collected from a book or paper.

EXTRACTION, in chemistry and pharmacy, the operation by which essences, tinctures, &c. are drawn from natural bodies. See EXTRACT.

EXTRACTION, in surgery, is the drawing any foreign matter out of the body by the hand, or by the help of instruments. See SURGERY.

EXTRACTION, in genealogy, implies the stock or family from which a person is descended. See DESCENT.

EXTRACTION of Roots, in algebra and arithmetic, the methods of finding the roots of given numbers or quantities. See ALGEBRA, and ARITHMETIC.

EXTRACTOR, in midwifery, an instrument or forceps for extracting children by the head.

EXTRAJUDICIAL, something done out of the proper court, or the ordinary course of law. As when judgment is given in a cause, or case, not depending in that court where such judgment is given, or where in the judge has no jurisdiction.

EXTRAORDINARIJ, amongst the Romans, was a body of men consisting of a third part of the foreign horse and a fifth of the foot, which was separated from the rest of the forces borrowed from the confederate states with great policy and caution, to prevent any design that they might possibly entertain against the natural forces. A more choice body of men were drawn from among the extraordinarii under the name of *ablecti*. See ABLECTI.

EXTRAORDINARY, something out of the common course.

EXTRAORDINARY Couriers, are those sent express on some urgent occasion.

EXTRAORDINARY Ambassador, or envoy, is such a one as is sent to treat or negotiate some special and important affair, as a marriage, a treaty, confederacy, &c. or even on occasion of some ceremony, as condolence, congratulation, &c.

A gazette, journal, or other news-paper extraordinary, is that published after some great and notable event, containing the detail or particulars thereof, which are not found in the ordinary papers.

EXTRAVAGANTES, those decretal epistles which were published after the CLEMENTINES.

They were so called, because at first they were not digested or ranged with the other papal constitutions, but seemed to be, as it were, detached from the canon law. They continued to be called by the same

N^o 122.

4

name when they were afterwards inserted in the body of the canon law. The first extravagantes are those of John XXII. successor of Clement V. The last collection was brought down to the year 1483, and was called the *common extravagantes*, notwithstanding that they were likewise incorporated with the rest of the canon law.

EXTRAVASATION, in contusions, fissures, depressions, fractures, and other accidents of the cranium, is when one or more of the blood-vessels, that are distributed in the dura mater, is broke or divided, whereby there is such a discharge of blood as greatly oppresses the brain, and disturbs its office; frequently bringing on violent pains and other mischiefs; and at length death itself, unless the patient is timely relieved. See SURGERY and MEDICINE.

EXTREME, is applied to the last and outermost part of any thing; or that which finishes and terminates it on that side.

EXTREMES, in logic, denote the two extreme terms of the conclusion of a syllogism; viz. the predicate and subject. They are called *extremes*, from their relation to another term, which is a medium or mean between them. The predicate, as being likewise had in the first proposition, is called the *major extremum*, greater extreme; and the subject, as being put in the second or minor proposition, is called the *minus extremum*, lesser extreme. Thus, in the syllogism, man is an animal; Peter is a man, therefore Peter is an animal; the word animal is the greater extreme, Peter the lesser extreme, and the man the medium. See SYLLOGISM.

EXTREME and mean proportion, in geometry, is when a line is so divided, that the whole line is to the greater segment, as that segment is to the other: Or, as Euclid expresseth it, when the line is so divided, that the rectangle under the whole line, and the lesser segment, is equal to the square of the greater segment.

EXTREME Unction. See UNCTION.

EXTREMITIES of figures, in painting, is used for the head, hands, and feet. These should be drawn with more nicety and exactness, or more terminated than other parts; and thus help to render the action more expressive.

EXTRINSIC among metaphysicians, is taken in various senses. Sometimes it signifies a thing's not belonging to the essence of another; in which sense, the efficient cause and end of a thing are said to be extrinsic. Sometimes it signifies a thing's not being contained within the capacity of another; in which sense, those causes are called extrinsic which introduce something into a subject from without, as when a fire introduces heat. Sometimes it signifies a thing added or applied to another; in which sense accidents and adherents are said to be extrinsic to the subjects to which they adhere. Sometimes the vision is said to be extrinsic from some form which does not exist in that thing, but is adjacent to it, or by some means or other without it.

EXTUBERANCES, in medicine, are swellings or risings up in the flesh or other parts of the body.

EXUBERANCE, (compounded of *ex* and *uber* "plentiful;") in rhetoric, a redundancy. See REDUNDANCE and PLEONASM.

EXUDATION. See EXSUDATION.

EXVERRÆ,

Extrava-
tion
||
Exudation.

EXVERRÆ
||
Eye.

EXVERRÆ, in antiquity, a kind of brush used in cleansing houses out of which a dead person had been carried.

EXULCERATION, in medicine, the act of causing or producing ulcers. Thus, arsenic exulcerates the intestines; corrosive humours exulcerate the skin.

EXULCERATION is sometimes also used for an ulcer itself; but more generally for those beginning erosions which wear away the substance, and form ulcers.

EXUVIÆ, among naturalists, denote the cast-off parts or coverings of animals, as the skins of serpents, caterpillars, and other insects.

EXUVIÆ is also used for some shells and other marine bodies, frequently found in the bowels of the earth; supposed to have been deposited there at the deluge, as being the real spoils of once living creatures. See SHELL, FOSSILE, and DELUGE.

EY, in our old writers, the same with *insula* "an island;" from which comes *eyet*, a small island or islet, vulgarly called *eyghit*.

EYCK. See BRUGES (John of.)

EYE, in anatomy. See ANATOMY, n° 142.

A new-born child shall be observed, perhaps, never to keep its eyes fixed on any one object, but continually changing from one to another, and if you put your hand before them, the child will not wink. Hence some have thought, that new born infants have no sight: but this is a mistake; and the true reason why their eyes are in perpetual motion is, that they have not yet acquired the habit of examining one thing at once with their eyes: their not winking at the approach of the hand, arises from their want of experience how easily their eyes may be hurt; but in a few days they get the habit of winking, so that afterwards their eyes do it spontaneously at the approach of danger.

Artificial eyes are made of concave plates of gold, silver, or glass, and are stained so as to resemble the natural eye. They must, when fixed in the orbit, be taken out and cleaned every night, and replaced in the morning. If no more of a diseased eye is removed than what is preternaturally projected, or if enough is left to preserve the muscles unhurt, the artificial eye will have a little motion from the muscles that remain. If the eye does not fit well, it irritates and inflames the other eye; in which case lay it aside, until one can be had that fits better.

Bull's EYE, in astronomy. See ALDEBARAN.

EYE of a Block, in naval affairs, that part of the rope-strop which is fastened to some necessary place in the ship: the strop is a sort of wreath or rope formed into a ring, and fixed round the block for the double convenience of strengthening the block and fastening it in any place where it is wanted.

EYE, in agriculture and gardening, signifies a little bud or shoot, inserted into a tree by way of graft. See ENGRAFTING.

EYE of a Tree, a small pointed knot to which the leaves stick, and from which the shoots or sprigs proceed. See GEMMA.

EYE, a town of Suffolk, 22 miles from Ipswich and

Eye
||
Ezra.

91 from London. It may be called an island, because it is surrounded by a brook near the borders of Norfolk, in the road between Ipswich and Norwich. It was incorporated by king John; has two bailiffs, 10 principal burgessees, 24 common council, a recorder, and town-clerk. It is a mean-built place, with narrow streets. The chief manufacture is bone-lace and spinning. Here is, however, a large handsome church; and near it are the ruinous walls of an ancient castle and monastery. The market is on Saturday, the fair on Whit-Monday. It has only sent members to parliament since the reign of Edward IV.

Ere-Bright. See EUPHRASIA.

EYMOUTH, a town of Scotland in the county of Berwick, formerly fortified to curb the garrison of Berwick, from which place it is distant six miles. W. Long. 1. 50. N. Lat. 55. 50. It gave title of baron in the kingdom of Scotland to Churchill, afterwards the great Duke of Marlborough; but he having no male issue, it became extinct in him.

EYRAC, or IRAC, ARABIA, a province of Turkey in Asia, 345 miles in length, and 190 in breadth; of which BAGDAD is the capital.

EYRAC Agemi, the principal province of Persia, anciently called PARTHIA.

EYRE, or EIRE, in law, the court of itinerant justices. See ASSIZE.

EYRIE, in falconry, a brood or nest, a place where hawks build and hatch their young.

EZEKIEL, a canonical book of the Old Testament, referring chiefly to the degenerate manners and corruptions of the Jews of those times. It abounds with fine sentences and rich comparisons, and discovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jeconiah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who prophesied at the same time in Judea. He foretold many events, particularly the destruction of the temple, the fatal catastrophe of those who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZION-GABER. See ASIONGABER.

EZRA, a canonical book of the Old Testament; comprehending the history of the Jews from the time of Cyrus's edict for their return, to the 20th year of Artaxerxes Longimanus. It specifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obstruction it met with, and the finishing thereof in the reign of Darius.

The illustrious author of this book was also the restorer and publisher of the canon of the Old Testament. See BIBLE.

The books of Ezra, called in the English version the *First and Second Books of Esdras*, though held by some, particularly the Greeks, for canonical, are thrown by the English church into the number of apocryphal books, being only extant in Greek.

F.

F A B

F
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Fabian.

F, THE fourth consonant, and sixth letter of the alphabet. The letter F is borrowed from the digamma or double gamma of the Ælians, as is evident from the inscription on the pedestal of the Colossus at Delos; and was undoubtedly formed from the old Hebrew vau: and though this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it and transmitted it to us.

It is formed by a strong expression of the breath, and joining at the same time the upper-teeth and under-lip. It has but one sort of sound, which has a great affinity with *v* and *ph*, the latter being written for it by us in all Greek words, as *philosophy*, &c. though the Italians write it *filosofia*.

The Romans for some time used an inverted F, *Ɔ*, instead of V consonant, which had no peculiar figure in their alphabet. Thus, in inscriptions we meet with TERMINA *Ɔ*IT, DI *Ɔ*I, &c. Lippius and others say, that it was the emperor Claudius who introduced the use of the inverted digamma, or *Ɔ*: but it did not long subsist after his death; for Quintilian observes, that it was not used in his time.

F, or FA, in music, is the fourth note in rising in this order of the gamut, *ut, re, mi, fa*. It likewise denotes one of the Greek keys in music, destined for the bass.

F, in physical prescriptions stands for *Fiat*, or "Let it be done." Thus *f. s. a.* signifies *fiat secundum artem*.

F was also a numeral letter, signifying 40; according to the verse,

Sexta quaterdenos gerit quæ distat ab alpha.

And when a dash was added at top, thus *F̄*, it signified forty thousand.

F, in the civil law. Two f's joined together thus, *ff*, signify the pandects. See PANDECTS.

F, in criminal law, a stigma or brand put upon felons with a hot iron, on their being admitted to the benefit of clergy; by stat. 4 H. 7. c. 13.

FABA, in botany. See VICIA.

FABAGO, in botany; a species of bean-caper, or ZYGOPHYLLUM.

FABER, in ichthyology; a species of ZEUS.

FABIAN (Robert), an alderman of the city of London, and sheriff in the year 1494; was a person of learning for the time he lived in, a good poet, and author of a Chronicle of England and France, intitled *The Concordance of Stories*, in two volumes folio, beginning with Brute, and ending with the 20th of Henry VII. 1504. It contains several curious particulars relative to the city of London, not elsewhere to be found. Stowe calls it "a painful labour, to the great honour of the city and of the whole realm." We are told that Cardinal Wolsey caused as many copies of this book as he could procure to be burned, be-

F A B

Fabii,
Fabius.

cause the author had made too clear a discovery of the large revenues of the clergy. Fabian died in 1512.

FABII, a noble and powerful family at Rome, who derived their name from *faba*, a bean, because some of their ancestors cultivated this pulse. They were once so numerous that they took upon themselves to wage a war against the Veientes. They came to a general engagement near the Cremera, in which all the family, consisting of 306 men, were totally slain, year of Rome 277. There only remained one whose tender age had detained him at Rome, and from him arose the noble Fabii in the following ages.

FABIUS (Maximus Rullianus), was the first of the Fabii who obtained the surname of *Maximus*, for lessening the power of the populace at elections. He was master of horse, and his victory over the Samnites in that capacity nearly cost him his life, because he engaged the enemy without the command of the dictator. He was five times consul, twice dictator, and once censor. He triumphed over seven different nations in the neighbourhood of Rome, and rendered himself illustrious by his patriotism.

FABIUS (Rusticus), an historian in the age of Claudius and Nero. He was intimate with Seneca; and the encomiums which Tacitus passes upon his style, make us regret the loss of his compositions.

Q. FABIVS (Maximus), a celebrated Roman, who from a dull and inactive childhood was raised to the highest offices of the state. In his first consulship he obtained a victory over Liguria, and the fatal battle of Thrasymenus occasioned his election to the dictatorship. In this important office he began to oppose Hannibal, not by fighting him in the open field, like his predecessors, but he continually harassed his army by countermarches and ambuscades, from which he received the surname of *Cunctator*, or *Delayer*. Hannibal sent him word, that "If he was as great a captain as he would be thought, he ought to come into the plain and give him battle." But Fabius coldly replied, "That if he was as great a captain as he would be thought, he would do well to force him to fight." Such operations for the commander of the Roman armies gave offence to some; and Fabius was even accused of cowardice. He, however, continued firm in his first resolutions; and patiently bore to see his master of horse raised to share the dictatorial dignity with himself, by means of his enemies at home. When he had laid down his office of dictator, his successors, for a while, followed his plan; but the rashness of Varro, and his contempt for the operations of Fabius, occasioned the fatal battle of Cannæ. Tarentum was obliged to surrender to his arms after the battle of Cannæ; and on that occasion the Carthaginian enemy observed that Fabius was the Hannibal of Rome. When he had made

Fabius
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Fabri.

made an agreement with Hannibal for the ransom of the captives, which was totally disapproved by the Roman senate, he sold all his estates to pay the money, rather than forfeit his word to the enemy. The bold proposals of young Scipio to go and carry the war from Italy to Africa, was rejected by Fabius as chimerical and dangerous. He did not, however, live to see the success of the Roman arms under Scipio, and the conquest of Carthage by measures which he treated with contempt and heard with indignation. He died in the 100th year of his age, after he had been five times consul, and twice honoured with a triumph. The Romans were so sensible of his great merit and services, that the expences of his funeral were defrayed from the public treasury.—His son bore the same name, and showed himself worthy of his noble father's virtues. During his consulship he received a visit from his father on horseback in the camp. The son ordered the father to dismount; and the old man cheerfully obeyed, embracing his son, and saying, "I wished to know whether you knew what it is to be consul." He died before his father, and Cunctator with the moderation of a philosopher delivered a funeral oration over the dead body of his son.

FABIUS, styled *Pictor*, a Roman general and historian. He first introduced painting at Rome; and having caused the walls of the temple of Health to be painted, some authors have erroneously reckoned him a painter. He died about 216 B. C.

FABLE, a tale, or feigned narration, designed either to instruct or divert, disguised under the allegory of an action, &c.

Fables were the first pieces of wit that made their appearance in the world; and have continued to be highly valued, not only in times of the greatest simplicity, but in the most polite ages of the world. Jonathan's fable of the trees is the oldest that is extant, and as beautiful as any that have been made since. Nathan's fable of the poor man is next in antiquity. We find Æsop in the most distant ages of Greece; and in the early days of the Roman commonwealth, we read of a mutiny appeased by the fable of the belly and the members. As fables had their rise in the very infancy of learning, they never flourished more than when learning was at its greatest height; witness Horace, Boileau, and Fontaine.

Fable is the finest way of giving counsel, and most universally pleasing, because least shocking; for, in the reading of a fable, a man thinks he is directing himself, whilst he is following the dictates of another, and consequently is not sensible of that which is the most unpleasing circumstance in advice. Besides, the mind is never so much pleased as when she exerts herself in any action that gives her an idea of her own abilities; this natural pride of the soul is very much gratified in the reading of fable.

FABLE, is also used for the plot of an epic or dramatic poem; and is, according to Aristotle, the principal part, and, as it were, the soul of the poem. See POETRY.

FABRI (Honorius), a laborious Jesuit born in the diocese of Bellay, distinguished himself by his skill in philosophy and the mathematics, and by writing a great number of books. The most curious of which treat of geometry, optics, the loadstone, the motion of

the earth, the ebbing and flowing of the sea, &c. He died at Rome in 1688.

FABRIANO (Gentile da), painter of history, was born at Verona in 1332, and became a disciple of Giovanni da Fiesole. In that early age of painting he rendered himself very famous, and was employed to adorn a great number of churches and palaces at Florence, Urbino, Siena, Perugia, and Rome, but particularly in the Vatican; and one picture of his, representing the Virgin and Child, attended by Joseph, which is preserved in the church of S. Maria Maggiore, was highly commended by Michael Angelo. By order of the Doge and Senate of Venice, he painted a picture in the great council-chamber, which was considered as so extraordinary a performance, that his employers granted him a pension for life, and conferred on him the highest honour of their state, which was, the privilege of wearing the habit of a noble Venetian. He died in 1412.

FABRIC, in general, denotes the structure or construction of any thing; but particularly of buildings, as a church, hall, house, &c. See ARCHITECTURE.

FABRIC-Lands, those formerly given towards rebuilding or repairing of cathedrals and other churches; for anciently almost every body gave more or less, by his will, to the fabric of the parish-church where he dwelt.

FABRICIUS (C.), a celebrated Roman, who in his first consulship, year of Rome 470, obtained several victories over the Samnites and Lucanians, and was honoured with a triumph. The riches which were acquired in those battles were immense, the soldiers were liberally rewarded by the consul, and the treasury was enriched with 400 talents. Two years after, Fabricius went as ambassador to Pyrrhus, and refused with contempt presents, and heard with indignation offers, which might have corrupted the fidelity of a less virtuous citizen. Pyrrhus had occasion to admire the magnanimity of Fabricius; but his astonishment was more powerfully awakened when he saw him make a discovery of the perfidious offers of his physician, who pledged himself to the Roman general for a sum of money to poison his royal master. To this greatness of soul was added the most consummate knowledge of military affairs, and the greatest simplicity of manners. Fabricius never used rich plate at his table. A small salt-cellar, the feet of which were of horn, was the only silver vessel which appeared in his house. This contempt of luxury and useless ornaments Fabricius wished to inspire among the people; and during his censorship he banished from the senate Cornelius Rufinus, who had been twice consul and dictator, because he kept in his house more than ten pound weight of silver plate. Such were the manners of the conqueror of Pyrrhus, who observed that he wished rather to command those that had money, than possess it himself. He lived and died in the greatest poverty. His body was buried at the public charge, and the Roman people were obliged to give a dowry to his two daughters when they had arrived to years of maturity.

FABRICIUS (George), a learned German, born at Chemnitz in Misnia, in 1516. After a liberal education, he visited Italy in quality of a tutor to a young nobleman; and, examining all the remains of antiquity with great accuracy, compared them with their de-

Fabiano
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Fabricius.

Fabrics
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scriptions in Latin writers. The result of these observations was his work intitled *Roma*, containing a description of that city. He afterwards settled at Misenum, where he conducted a great school to the time of his death in 1571. He was also the author of a great number of sacred Latin poems, wrote seven books of the *Annals of Misnia*, three of the *Annals of Meissen*, and *Travels*.

FABRICIUS (Jerom), a celebrated physician in the latter end of the 16th century (surnamed *Aquapendente*, from the place of his birth), was the disciple and successor of Fallopius. He chiefly applied himself to surgery and anatomy, which he professed at Padua for 40 years with extraordinary reputation. The republic of Venice settled a large pension upon him, and honoured him with a gold chain and a statue. He died in 1603; leaving behind him several works which are much esteemed.

FABRICIUS (John Albert), one of the most learned and laborious men of his age, was born at Leipzig in 1668. He was chosen professor of eloquence at Hamburg in 1699, and was made doctor of divinity at Kiel. His works are numerous; and he died at Hamburg in 1736, after a life spent in the severest literary application to collect and publish valuable remains of ancient learning.

FABRICIUS (Vincent), born at Hamburg in 1613, was a good poet, a great orator, an able physician, and a learned civilian. He was for some time counsellor to the bishop of Lubec, and afterward burgo-master and syndic of the city of Dantzic; from whence he was 13 times sent deputy into Poland, where he died at Warsaw in 1657, during the diet of that kingdom. The most complete edition of Fabricius's poems and other works was published at Leipzig in 1685, under the direction of his son Frederic Fabricius.

FABRICIUS (Baron), one of the finest gentlemen of his time, and known to the public by his letters relating to the transactions of Charles XII. of Sweden during his residence in the Ottoman empire, was descended from a good family in Germany. He was taken early into the service of the court of Holstein; and was sent in a public character to the king of Sweden whilst he was at Bender; where he soon acquired the good graces of that prince. He accompanied him in his exercises; gave him a turn for reading; and it was out of his hand Charles snatched Boileau's satires, when he tore out those that represented Alexander the Great as a madman. Fabricius was also in favour with Stanislaus, and with our king George I. whom he accompanied in his last journey to Hanover, and was with him when he died. A translation of his letters was published in London 1761.

FABROT (Charles Hannibal), one of the most celebrated civilians of his time, was born at Aix in 1681; and acquired an extraordinary skill in the civil and canon law, and in the belles lettres. He published the *Basilica*, or Constitutions of the Emperors of the East, in Greek and Latin, with learned notes, in seven vols folio; and editions of *Cedrenus*, *Nicetas*, *Anastasius*, *Bibliothecarius*, *Constantine Manasses*, and *Cujas*, with learned and curious notes.

FABULOUS, something consisting of, or connected with, a fable.

FABULOUS Age, among ancient historians. See *AGE*.

FACE, the surface, or first side which a body presents to the eye. We say, the *face* of the earth, of the waters, &c. Polyhedrons have several *faces*. A die, or cube, has six *faces*.

FACE, is particularly used for the visage of an animal, and especially of man; and comprehends, in the latter, all that part of the head which is not covered with the common long hair. The Latins call it *facies*, *vultus*, *os*, &c.

The human face is called the *image of the soul*, as being the seat of the principal organs of sense; and the place where the ideas, emotions, &c. of the soul are chiefly set to view. Pride and disdain are shown in the eye-brows, modesty on the cheeks, majesty in the forehead, &c. It is the face shows the sex, age, temperaments, health, or disease, &c.

The face, considered as the index of the passions, habits, &c. of the person, makes the subject of physiognomy. See *PHYSIOGNOMY*.

FACE, among painters and artists, is used to denote a certain dimension of the human body, adopted for determining the proportion which the several parts should bear to one another. See *DRAWING*.

FACE, in the military art, a word of command, intimating to turn about: thus, *face to the right*, is to turn upon the left heel a quarter-round to the right; and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

FACIES HIPPOCRATICA, in medicine, is when the nostrils are sharp, the eyes hollow, the temples low, the tips of the ears contracted and cold, the forehead dry and wrinkled, and the complexion pale or livid.—The Hippocratic face is chiefly observed towards the period of phthises and other consumptions, and is held a sure prognostic of death. If it appears within three days after the attack of an acute disease, it is deemed to indicate death.

FACTION, a cabal or party formed in a state, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus. They were four, viz. the white, the red, the green, and the blue; to which Domitian added another of purple colour. They were so denominated from the colour of the liveries they wore; and were dedicated, according to M. Aur. Cassiodorus, to the four seasons of the year; the green being consecrated to spring, the blue to winter, the red to summer, and the white to autumn. It appears from ancient inscriptions, that each faction had its procurators and physician; and from history, that party-rage ran so high among them, that in a dissension between two factions, in the time of Justinian, almost 40,000 men lost their lives in the quarrel.

FACTITIOUS, any thing made by art, in opposition to what is the produce of nature. Thus, factitious cinnabar is opposed to native cinnabar.

FACTOR, in commerce, is an agent employed by merchants residing at other places, to buy or sell goods, or negotiate bills, or transact any kind of business on their account; and intitled to a certain allowance for his trouble.

A supercargo differs from a factor in this: The business of the former is limited to the care of a particular cargo; he goes along with it, and generally returns when his business is completed: the latter has a

Face
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Factor.

fixed

Factor. fixed residence abroad, and executes business for different merchants. But their duties, and the circumstances for which they are accountable, are the same.

The duty of a factor is to procure the best intelligence of the state of trade at his place of residence; of the course of exchange; of the quantity and quality of goods at market, their present price, and the probability that it may rise or fall; to pay exact obedience to the orders of his employers; to consult their advantage in matters referred to his direction; to execute their business with all the dispatch that circumstances admit; to be early in his intelligence, distinct in his accounts, and punctual in his correspondence.

A factor's power is either absolute or limited. Though intrusted with ample discretionary powers, he is not warranted to take unreasonable or unusual measures, or do any thing contrary to his employer's interest; but it is incumbent on the employer, if he challenge his proceedings, to prove that he could have done better, and was guilty of wilful mismanagement.

When a factor's power is limited, he must adhere strictly to his orders. If he exceeds his power, though with a view to his employer's interest, he is liable for the consequence. For example, if he gives credit when not empowered, or longer credit if not empowered, for the sake of a better price, and the buyer proves insolvent, he is liable for the debt. A factor has no power to give credit unless authorized: But if the goods consigned be generally sold on credit at the place of consignment, the factor will be vindicated for selling at the usual credit, unless expressly restricted.

Although opinion will never justify the factor for departing from orders, necessity sometimes will. If he be limited not to sell goods under a certain price, and the goods be perishable, and not in a situation for being kept, he may sell them, to prevent their destruction, even under the price limited.

A factor is never warranted to deal on trust, except with persons in good credit at the time. If the employer challenge the debtors, it is incumbent on him to prove that their bad circumstances was known at the time of sale; and the factor will be vindicated, if he trusted them at the same time for goods of his own.

If the factor sells his employer's goods on trust, and, after the day of payment is elapsed, receive payment from the purchaser for a debt of his own, he becomes liable in equity for the debt.

In case of bankruptcy, the factor ought immediately to lay attachments, and advise his employers; and he cannot withdraw his attachments, nor compound debts without orders.

If a factor sells goods belonging to different merchants to the same person, and the buyer proves insolvent, they shall bear the loss in equal proportions; and, if the buyer has paid part before his insolvency, without specifying for which, the payment ought to be distributed in equal proportions; but, if the days of payment be fixed, and part of the debts only due, the payment ought to be applied, in the first place, to such debts as were due.

If he makes a wrong entry at the custom-house, and the goods be seized in consequence thereof, he must bear the loss, unless the error be occasioned by a mistake in the invoice, or letter of advice.

The owner bears the loss of goods seized when attempted to be smuggled by his orders; but the factor complying with an unlawful order is liable in such penalties as the laws exact.

If a factor saves the duty of goods due to a foreign prince, he shall have the benefit; for, if detected, he bears the loss.

If a factor sells goods bought by his employer's orders for his own advantage, the employer may recover the benefit, and the factor shall be amerced for the same.

If a factor receives bad money in payment, he bears the loss; but if the value of the money be lessened by the government, the employer bears the loss.

A factor is not liable for goods spoiled, robbed, or destroyed by fire.

If a factor receives counterfeit jewels from his employer, and sells them, the employer is liable to indemnify him for any penalties he may incur.

If a factor be ordered to make insurance, and neglect it, and the subject be lost, he is liable to make it good, providing he had effects in his hands.

If a factor buys goods for his employer, his bargain shall be binding on the employer.

In case of a factor's insolvency, the owner may reclaim his goods; and, if they be sold on trust, the owner (and not the factor's creditors) shall recover payment of the debts.

FACTOR, in multiplication, a name given to the multiplier and multiplicand, because they constitute the product. See **ARITHMETIC**.

FACTORAGE, called also *commission*, is the allowance given to factors by the merchant who employs them.

A factor's commission in Britain, on most kinds of goods, is $2\frac{1}{2}$ per cent.: on lead, and some other articles, 2 per cent.; in Italy, $2\frac{1}{2}$ per cent.; in France, Holland, Spain, Portugal, Hamburg, and Dantzick, 2 per cent.; in Turkey, 3 per cent.; in North America, 5 per cent. on sales, and 5 per cent. in returns; in the West Indies, 8 per cent. for commission and storage. In some places, it is customary for the factors to insure the debts for an additional allowance, generally $1\frac{1}{2}$ per cent. In that case, they are accountable for the debt when the usual term of credit is expired.

Factorage on goods is sometimes charged at a certain rate per cask, or other package, measure, or weight, especially when the factor is only employed to receive or deliver them.

FACTORY is a place where a considerable number of factors reside, to negotiate for their masters or employers. See **FACTOR**.

The most considerable factories belonging to the British are those established in the East Indies, Portugal, Turkey, &c. There are also English factories established at Hamburg, Petersburg, Dantzic, and in Holland; all endowed with certain privileges.

FACTUM, in arithmetic, the product of two quantities multiplied by each other.

FACULÆ, in astronomy, certain bright and shining parts, which the modern astronomers have, by means of telescopes, observed upon or about the surface of the sun: they are but very seldom seen.—The word is pure Latin; being a diminutive of *fax*, "torch;" and supposed

Faculty
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Faernus.

posed to be here applied from their appearing and disappearing by turns.

FACULTY, in law, a privilege granted to a person, by favour and indulgence, of doing what, by law, he ought not to do.

For granting these privileges, there is a court under the archbishop of Canterbury, called the *court of the faculties*. The chief officer of this court is styled *master of the faculties*, and has a power of granting dispensations in divers cases; as, to marry without the bans being first published, to eat flesh on days prohibited, to ordain a deacon under age, for a son to succeed his father in his benefice, a clerk to hold two or more livings, &c.

FACULTY, in the schools, a term applied to the different members of an university, divided according to the arts and sciences taught there: thus in most universities there are four faculties, viz. 1. Of arts, which include humanity and philosophy. 2. Of theology. 3. Of physic. And, 4. Of civil law.

FACULTY of Advocates. See **ADVOCATES**.

FACULTY is also used to denote the powers of the human mind, viz. understanding, will, memory, and imagination. See **METAPHYSICS**.

FÆCES, in chemistry, the gross matter, or sediment, that settles at the bottom after distillation, fermentation, and the like.—The fæces of wine are commonly called **LEES**.

FÆCES, in medicine, the excrements voided by stool. See **EXCREMENTS**.

FÆCULENT, in general, is applied to things abounding with fæces or dregs: thus the blood and other humours of the human body are said to be fæculent, when without that purity which is necessary to health.

FAENZA, a city of Romania in Italy, with a bishop's see. It is an ancient place, and has undergone various revolutions. The river Amona washes its walls, and passes between the city and the suburbs, which are joined by a stone-bridge defended by two good towers. The city is remarkable for its earthen ware, which is the best in all Italy.

FAERNUS (Gabriel), a native of Cremona in Italy, was an excellent Latin poet and critic of the 16th century. He was so skilled in all parts of polite literature, that the cardinal de Medicis, afterward Pope Pius IV. was particularly fond of him. He was the author of some Latin elegies; of 100 Latin fables, selected from the ancients, written in iambic verse; and of several pieces of criticism, as *Censura emendationum Livianarum*, *De Metris Comicis*, &c. He was remarkably happy in decyphering manuscripts, and restoring ancient authors to their purity: he took such pains with Terence in particular, that Bentley has adopted all his notes in the edition he gave of that writer. He died at Rome in 1561; and Thuanus, who wrote his eloge, says, that the learned world was greatly obliged to him, yet had been still more so, if, instead of suppressing the then unknown fables of Phædrus, for fear of lessening the value of his own Latin fables, written in imitation of Æsop, he had been content with imitating them. M. Perault, however, who translated Faernus's fables into French, has defended him from this imputation, by affirming that the first MS. of Phædrus's fables, found in the dust of an old

library, was not discovered till about 30 year after Faernus's death.

FAGARA, IRON-WOOD: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 43d order, *Dumosa*. The calyx is quadriid, the corolla tetrapetalous, and the capsule bivalved and monospermous. There are five species; all natives of the warm parts of America, rising with woody stems more than 20 feet high. They are propagated by seeds; but in this country must be kept continually in a stove.

FAGE (Raimond de la), an excellent designer and engraver, highly esteemed by Carlo Maratti, was born at Toulouse in 1648. He applied himself to designing, through inclination, in spite of his parents; and had no master nor any assistance: but his superior talents supplied the want of them, and he became one of the best designers in Europe; but his performances on licentious subjects are the most esteemed. It is reported of this artist, that he never made use of money, but contracted debts; and when the accounts were brought him, he drew upon the back of the bills, and bid the owners sell the drawings to connoisseurs for the amount, by which they were generally great gainers. Several of those drawings are in the cabinets of the curious. He led a loose, depraved life; which his repeated debaucheries put an end to at the age of 42.

FAENSA, a city and bishop's see of Italy, situated in the pope's territories, about 30 miles east of Bologna: E. Long. 12. 38. and N. Lat. 44. 30.

FAGGOT, in times of popery here, was a badge worn on the sleeve of the upper garment of such persons as had recanted or abjured what was then termed *heresy*; being put on after the person had carried a faggot, by way of penance, to some appointed place of solemnity. The leaving off the wear of this badge was sometimes interpreted a sign of apostacy.

FAGGOTS, among military men, persons hired by officers, whose companies are not full, to muster and hide the deficiencies of the company; by which means they cheat the king of so much money.

FAGIUS (Paul), *alias* **BUCHLIN**, a learned Protestant minister, born at Rheinzabem in Germany in 1504. He was a schoolmaster at Isna; but afterwards became a zealous preacher, and wrote many books. The persecution in Germany menacing danger to all who did not profess the Romish doctrines, he and Bucer came over to England in 1549, at the invitation of archbishop Cranmer, to perfect a new translation of the scriptures. Fagius took the Old Testament, and Bucer the New, for their respective parts; but the design was at that time frustrated by the sudden deaths of both. Fagius died in 1550, and Bucer did not live above a year after. Their bodies were dug up and buried in the reign of queen Mary.

FAGONIA, in botany: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 14th order, *Gruinales*. The calyx is pentaphyllous; the petals are five, and heart-shaped; the capsule is quinquelocular, ten-valved, with the cells monospermous. There are three species, natives of Spain, Crete, and Arabia.

FAGOPYRUM, or **BUCK-WHEAT**. See **POLYGONUM**.

Fagus.

FAGUS, the BEECH-TREE: A genus of the polyandria order, belonging to the monoecia class of plants; and in the natural method ranking under the 50th order, *Amentaceae*. The male calyx is quinquefid and campanulated; there is no corolla; the stamina are 12: The female calyx is quinque-dentated; there is no corolla; there are three styles; the capsule (formerly the calyx) is muricated and quadrivalved; the seeds, two in number. There are three species. 1. The sylvaticus, or beech-tree, rises 60 or 70 feet high, and has a proportionable thickness, branching upward into a fine regular head, garnished with oval serrated leaves, with flowers in globular catkins, succeeded by angular fruit called *maffs*. 2. The castanea, or chestnut-tree, hath a large upright trunk growing 40 or 50 feet high, branching regularly round into a fine spreading head, garnished with large spear-shaped acutely serrated leaves naked on the under side, having flowers in long amentums, succeeded by round prickly fruit, containing two or more nuts. 3. The pumila, dwarf chestnut-tree, or chinkapin, rises eight or ten feet high, with a branching shrubby stem, and oval spear-shaped and acutely serrated leaves, hoary on the under side.

Culture. The first is very easily raised from the mast or seed. "For woods (says Evelyn), the beech must be governed as the oak:—In nurseries, as the ash; sowing the masts in autumn, or later, even after January, or rather nearer the spring, to preserve them from vermin, which are very great devourers of them. But they are likewise to be planted of young seedlings to be drawn out of the places where the fruitful trees abound." Millar says, the season for sowing the masts "is any time from October to February, only observing to secure the seeds from vermin when early sowed, which, if carefully done, the sooner they are sown the better, after they are fully ripe." Hanbury orders a sufficient quantity of masts to be gathered about the middle of September, when they begin to fall: these are to be "spread upon a mat in an airy place six days to dry; and after that you may either proceed to sow them immediately, or you may put them up in bags in order to sow them nearer the spring; which method I would rather advise, as they will keep very well, and there will be less danger of having them destroyed by mice or other vermin, by which kinds of animals they are greatly relished." They must be sown in beds properly prepared about an inch deep. In the first spring many of the young plants will appear, whilst others will not come up till the spring following. Having stood two years in the seminary, they should be removed to the nursery, where they may remain till wanted.

The propagation of the second species is also chiefly from seeds. Evelyn says, "Let the nuts be first spread to sweat, then cover them in sand; a month being past, plunge them in water, and reject the swimmers; being dried for 30 days more, sand them again, and to the water-ordeal as before. Being thus treated until the beginning of spring or in November, set them as you would do beans; and, as some practise it, drenched for a night or more in new milk; but with half this preparation they need only to be put into the holes with the point upmost, as you plant tulips. If you design to set them in winter or autumn, I counsel you to inter them in their husks, which being every

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way armed, are a good protection against the mouse, and a providential integument."—"Being come up, they thrive best unremoved, making a great stand for at least two years upon every transplanting; yet if needs you must alter their station, let it be done about November." Millar cautions us against purchasing foreign nuts that have been kiln-dried, which (he says) is generally done to prevent their sprouting in their passage; therefore he adds, "If they cannot be procured fresh from the tree, it will be much better to use those of the growth of England, which are full as good to sow for timber or beauty as any of the foreign nuts, though their fruit is much smaller." He also recommends preserving them in sand, and proving them in water. In setting these seeds or nuts (he says) "the best way is to make a drill with a hoe (as is commonly practised for kidney-beans) about four inches deep, in which you should place the nuts, at about four inches distance, with their eye uppermost; then draw the earth over them with a rake, and make a second drill at about a foot distance from the former, proceeding as before, allowing three or four rows in each bed.—In April (he does not mention the time of sowing) these nuts will appear above-ground; you must therefore observe to keep them clear from weeds, especially while young; in these beds they may remain for two years, when you should remove them into a nursery at a wider distance. The best time for transplanting these trees is either in October or the latter end of February, but October is the best season: the distance these should have in the nursery is three feet row from row, and one foot in the rows. If these trees have a downright tap-root, it should be cut off, especially if they are intended to be removed again: this will occasion their putting out lateral shoots, and render them less subject to miscarry when they are removed for good. The time generally allowed them in the nursery is three or four years, according to their growth; but the younger they are transplanted, the better they will succeed. Young trees of this sort are very apt to have crooked stems; but when they are transplanted out and have room to grow, as they increase in bulk they will grow more upright, and their stems will become straight, as I have frequently observed where there have been great plantations."—Hanbury follows Millar almost literally; except that he mentions February as the time of sowing; and recommends that the young plants, a year after they have been planted in the nursery, be cut down to within an inch of the ground; which (he says) "will cause them to shoot vigorously with one strong and straight stem." There is one material objection against sowing chestnuts in drills, which are well known to serve as guides or conductors to the field-mouse, who will run from one end to the other of a drill without letting a single nut escape her: we rather recommend setting them with a dibble, either promiscuously or a quincunx, at about six inches distance. Evelyn says, that coppices of chestnuts may be thickened by layering the tender young shoots; but adds, that "such as spring from the nuts and marrons are best of all." There is a striped-leaved variegation which is continued by budding; and the French are said to graft chestnuts for their fruit; but Millar says, such grafted trees are unfit for timber. The chestnuts will thrive

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thrive upon almost any soil which lies out of the water's way; but disaffects wet moory land.

The method of propagating the dwarf chefnut is from seeds, which we receive from America. These should be planted in drills, as soon as they arrive, in a moistish bed of rich garden-mould. If the seeds are good, they will come up pretty soon in the spring. After they appear, they will require no trouble, except keeping them clean from weeds, and watering them in dry weather. They may stand in the feed-bed two years, and be afterwards planted in the nursery-ground, at a foot asunder and two feet distance in the rows; and here when they are got strong plants, they will be fit for any purpose.

Properties and Uses. In stateliness and grandeur of outline, the beech vies with the oak. Its foliage is peculiarly soft and pleasing to the eye; its branches are numerous and spreading; and its stem waxes to a great size. The bark of the beech is remarkably smooth, and of a silvery cast; this, added to the splendor and smoothness of its foliage, gives a striking neatness and delicacy to its general appearance. The beech, therefore, standing singly, and suffered to form its own natural head, is highly ornamental; and its leaves varying their hue as the autumn approaches, renders it in this point of view still more desirable. In point of actual use the beech follows next to the oak and the ash: it is almost as necessary to the cabinet-makers and turners (especially about the metropolis), as the oak is to the ship-builder, or the ash to the plough and cart wright. Evelyn nevertheless condemns it in pointed and general terms; because "where it lies dry, or wet and dry, it is exceedingly obnoxious to the worm." He adds, however, "but being put ten days in water, it will exceedingly resist the worm." The natural soil and situation of the beech is upon dry, chalky, or limestone heights: It grows to a great size upon the hills of Surry and Kent; as also upon the declivities of the Cotswold and Stroudwater hills of Gloucestershire, and flourishes exceedingly upon the bleak banks of the Wye, in Hereford and Monmouth shires; where it is much used in making charcoal. In situations like those, and where it is not already prevalent, the beech, whether as a timber-tree or as an underwood, is an object worthy the planter's attention.

The mast, or seeds, yield a good oil for lamps; and are a very agreeable food to squirrels, mice, and swine. The fat of swine fed with them, however, is soft, and boils away unless hardened by some other food. The leaves gathered in autumn, before they are much injured by the frosts, make much better mattresses than straw or chaff; and last for seven or eight years. The nuts, when eaten by the human species, occasion giddiness and headach; but when well dried and powdered, they make wholesome bread. They are sometimes roasted, and substituted for coffee. The poor people in Silesia use the expressed oil instead of butter.

The chefnut tree sometimes grows to an immense size. The largest in the known world are those which grow upon Mount Ætna in Sicily*. At Tortworth in Gloucestershire, is a chefnut tree 52 feet round. It is proved to have stood there ever since the year 1150, and was then so remarkable that it was called the *great chefnut of Tortworth*. It fixes the boundary of the manor.

* See *Ætna*,
n^o 18. and
Plate
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nor, and is probably near 1000 years old. As an ornamental, the chefnut, tho' unequal to the oak, the beech, and the esculus, has a degree of greatness belonging to it which recommends it strongly to the gardener's attention. Its uses have been highly extolled; and it may deserve a considerable share of the praise which has been given it. As a substitute for the oak, it is preferable to the elm: For door-jambs, window-frames, and some other purposes of the house-carpenter, it is nearly equal to oak itself; but it is very apt to be shakey, and there is a deceitful brittleness in it which renders it unsafe to be used as beams, or in any other situation where an uncertain load is required to be borne. It is universally allowed to be excellent for liquor casks; as not being liable to shrink, nor to change the colour of the liquor it contains: it is also strongly recommended as an underwood for hop-poles, stakes, &c. Its fruit too is valuable, not only for swine and deer, but as a human food: Bread is said to have been made of it. Upon the whole, the chefnut, whether in the light of ornament or use, is undoubtedly an object of the planter's notice.

FAINT-ACTION, in law, a feigned action, or such as, although the words of the writ are true, yet, for certain causes, the plaintiff has no title to recover thereby.

FAINT-Pleader, in law, a covinous, false, or collusive manner of pleading, to the deceit of a third person.

FAINTING. See **LIPOTHYMIA**.

FAINTS, in the distillery, the weak spirituous liquor that runs from the still in rectifying the low wines after the proof-spirit is taken off.

FAINTS, is also the last runnings of all spirits distilled by the alembic. The clearing the worm of these is so essential a point in order to the obtaining a pure spirit by the subsequent distillation, that all others are fruitless without it.

FAIR, a greater kind of market, granted to a town, by privilege, for the more speedy and commodious providing of such things as the place stands in need of.

The word fair, is formed from the French *foire*, which signifies the same thing; and *foire* is by some derived from the Latin *forum*, "market;" by others from the Latin *feria*, because anciently fairs were always held in the places where the wakes, or feasts of the dedications of churches, called *feria*, were held. See **FERIÆ**.

It is incident to a fair, that persons shall be free from being arrested in it for any other debt or contract than what was contracted in the same; or, at least, promised to be paid there. These fairs are generally kept once or twice a year; and, by statute, they shall not be held longer than they ought, by the lords thereof, on pain of their being seized into the king's hands, &c. Also proclamation is to be made, how long they are to continue; and no person shall sell any goods after the time of the fair is ended, on forfeiture of double the value, one fourth to the prosecutor and the rest to the king. There is a toll usually paid in fairs on the sale of things, and for stallage, picage, &c.

Fairs abroad are either free, or charged with toll and impost. The privileges of free fairs consist chiefly, first, in that all traders, &c. whether natives or foreigners, are allowed to enter the kingdom, and are under the royal protection, exempt from duties, impositions,

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Fair. positions, tolls, &c: Secondly, that merchants, in going or returning, cannot be molested or arrested, or their goods stopped. They are established by letters-patent from the prince. Fairs, particularly free fairs, make a very considerable article in the commerce of Europe, especially that of the Mediterranean, and inland parts of Germany, &c.

The most celebrated fairs in Europe are those, 1. Of Francfort, held twice a-year, in spring and autumn: the first commencing the Sunday before Palm-Sunday, and the other on the Sunday before the eighth of September. Each lasts 14 days, or two weeks; the first of which is called the *week of acceptance*, and the second the *week of payment*. They are famous for the sale of all kinds of commodities; but particularly for the immense quantity of curious books no where else to be found, and whence the booksellers throughout all Europe used to furnish themselves. Before each fair, there is a catalogue of all the books to be sold thereat, printed and dispersed, to call together purchasers: though the learned complain of divers unfair practices therein; as fictitious titles, names of books purely imaginary, &c. beside great faults in the names of the authors, and the titles of the real books.

—2. The fairs of Leipstick, which are held thrice a-year: one beginning on the first of January; another three weeks after Easter; and a third after Michaelmas. They hold 12 days a piece; and are at least as considerable as those of Francfort. 3. The fairs of Novi, a little city in the Milanese, under the dominion of the republic of Genoa. There are four in the year, commencing on the second of February, the second of May, the first of August, and second of September. Though the commodities bought and sold here be very considerable; yet, what chiefly contributes to render them so famous, is the vast concourse of the most considerable merchants and negotiants of the neighbouring kingdoms, for the transacting of affairs and settling accounts.

4. The fairs of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the English, Dutch, and French ships, as also from all parts of the Baltic. The best time for the sale of goods at Riga is during the fairs. Since the building of the famous city of Petersburg, these fairs have suffered some diminution. 5. Fair of Archangel, during which all the trade foreigners have with that city is managed. It holds a month, or six weeks at most, commencing from the middle of August. The Muscovite merchants attend here from all parts of that vast empire; and the English, Dutch, French, Swedish, Danish, and other ships in the port of that city, on this occasion, ordinarily amount to 300. But this is no free fair as the rest are: The duties of exportation and importation are very strictly paid, and on a very high footing. 6. The fair of St Germain, one of the suburbs of Paris, commencing on the third of February, and holding till Easter; though it is only free for the first 15 days. 7. The fairs of Lyons, which Mons. du Chefne, in his antiquity of cities, would insinuate, from a passage in Strabo, were established by the Romans; though it is certain, the fairs, as they now stand, are of a much later date. There are three in the year, each lasting 20 days, and free for ever. They begin on Easter Monday, the 26th

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of July, and the first of December. 8. Fair of Guibray, a suburb of the city of Falaife, in the Lower Normandy. It is said to have been established by our William the Conqueror, in consideration of his being born at Falaife. It commences on the 16th of August; and holds 15 days free by charter, and longer by custom. 9. Fair of Beaucaire, held partly in a city of that name, in Languedoc, and partly in the open country, under tents, &c. It commences on the 22d of July, and only holds for three days; yet it is the greatest and most celebrated of all the fairs in that part of Europe, both for the concourse of strangers from all parts of the world, and for the traffic of all kind of goods: the money returned in these three days amounting sometimes to above six millions of livres.

The fairs of Porto-bello, Vera Cruz, and the Havana, are the most considerable of all those in America. The two first last as long as the flota and galleons continue in those parts; and the last is opened as soon as the flota or galleons arrive there upon their return for Spain; this being the place where the two fleets join. See FLOTA, and GALLEONS.

The principal British fairs are, 1. Sturbridge-fair, near Cambridge, by far the greatest in Britain, and perhaps in the world. 2. Bristol has two fairs, very near as great as that of Sturbridge. 3. Exeter. 4. West Chester. 5. Edinburgh. 6. Weyhill; and, 7. Burford-fair; both for sheep. 8. Pancras fair, in Staffordshire, for saddle-horses. 9. Bartholemew fair, at London, for lean and Welch black cattle. 10. St Faith's, in Norfolk, for Scotch runts. 11. Yarmouth fishing-fair for herrings, the only fishing fair in Great Britain. 12. Ipswich butter-fair. 13. Woodborough hill, in Dorsetshire, for west-country manufactures, as kerseys, druggits, &c. 14. Two cheese fairs at Chipping Norton: with innumerable other fairs, besides weekly markets, for all sorts of goods, as well our own as of foreign growth.

FAIR, in sea language, is used for the disposition of the wind, when it is favourable to a ship's course, in opposition to that which is contrary or foul. The term *fair* is more comprehensive than *large*, and includes about 16 or 18 points of the compass; whereas *large* is confined to the beam or quarter, that is, to a wind which crosses the keel at right angles, or obliquely from the stern, but never to one right a-stern.

FAIR (Isle), a small island lying between Orkney and Shetland, 12 or 10 leagues E. N. E. from the former; and seven, eight, or 10 leagues, S. W. from the latter: It is three miles long, and scarce half a mile broad, very craggy, with three high rocks which are visible both from Orkney and Shetland. There is in this island a small quantity of arable land, which is very fruitful and well manured; and there might be considerably more, but the inhabitants are obliged to reserve it for peat and pasturage. They have for the size of the island a great many sheep, and those very good and fat; but they have no kind of moor-fowl or other game; but there is great plenty of sea and water fowl, and all kinds of fish upon their coasts. There is in effect no port, though they have two that are nominally so: one at the south end, which is full of rocks, where only small boats can lie, and that but indifferently; the other at the north-east end, larger and safer in summer, so that it serves commodiously enough for

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their fishery. The duke of Medina Sidonia, when commander of the famous Spanish armada in 1588, was wrecked on the east coast of this island. The ship broke to pieces, but the duke and 200 men made their escape. They lived here so long, that both they and the inhabitants were almost famished. At length the duke and the poor remains of his people were carried over to the main land of Shetland, and then to Dunkirk, by one Andrew Humphry, for which service Andrew was rewarded with 3000 merks. This island produced to its former proprietor between 50l. and 60l. Sterling. It was sold at Edinburgh, on the 20th of June 1766, for about 850l. to James Stewart of Burgh, Esq.

FAIR-Curve, is a winding line, used in delineating ships, whose shape is varied, according to the part of the ship which it is intended to describe.

FAIR-Way, in sea language, the path or channel of a narrow bay, river, or haven, in which ships usually advance in their passage up and down; so that if any vessels are anchored therein, they are said to lie in the fair-way.

FAIRFAX (Edward), natural son of Sir Thomas Fairfax, was an English poet who lived in the reigns of Elizabeth and James I. He wrote several poetical pieces, and was an accomplished genius. Dryden introduces Fairfax with Spencer, as the leading writers of the times; and even seems to give the preference to the former in the way of harmony, when he observes that Waller owned himself indebted for the harmony of his numbers to Fairfax's *Godfrey of Boulogne*. He died about the year 1632, at his own house called *New-hall*, in the parish of Fuyston, between Denton and Knareborough, and lies under a marble stone.

FAIRFAX (Sir Thomas), general of the parliamentary forces against Charles I. in 1644. See (*History of*) BRITAIN, n^o 127. *et seq.* He resigned in 1650; after which he lived privately, till he was invited by general Monk to assist him against Lambert's army. He cheerfully embraced the occasion; and, on the third of December 1659, appeared at the head of a body of gentlemen of Yorkshire; when, upon the reputation of his name, a body of 12,000 men forsook Lambert and joined him. He was at the head of the committee appointed by the House of Commons to attend king Charles II. at the Hague, to desire him speedily to return to England; and having readily assisted in his restoration, returned again to his seat in the country; where he lived in a private manner till his death, which happened in 1671, in the 60th year of his age.—He wrote, says Mr Walpole, memorials of Thomas lord Fairfax, printed in 1699; and was not only an historian, but a poet. In Mr Thoresby's museum were preserved in manuscript the following pieces: The Psalms of David, the Canticles, the Songs of Moses, and other parts of Scripture, versified; a poem on Solitude; Notes of Sermons, by his lordship, by his lady daughter of Horace lord Vere, and by their daughter Mary the wife of George second duke of Buckingham; and a Treatise on the Shortness of Life. But of all lord Fairfax's works, says Mr Walpole, the most remarkable were the verses he wrote on the horse on which Charles II. rode to his coronation, and which had been bred and presented to the king by his lordship. How must that

merry monarch, unapt to keep his countenance on more serious occasions, have smiled at this awkward homage from the old victorious hero of republicanism and the covenant! He gave a collection of manuscripts to the Bodleian library.

FAIRFORD, a town in Gloucestershire, with a market on Thursdays. It is remarkable for the church, which has curious painted glass-windows. They are said to have been taken in a ship by John Tame, Esq; towards the end of the 15th century, who built the church for their sake. They are preserved entire, and the figures are extremely well drawn and coloured. They represent the most remarkable histories in the Old and New Testament. They are frequently visited by travellers, and many go on purpose to view them, as one of the greatest curiosities in England. The painter was Albert Durer. W. Long. 1. 46. N. Lat. 51. 42.

FAIRY, in ancient traditions and romances, signifies a sort of deity, or imaginary genius, conversant on the earth, and distinguished by a variety of fantastical actions either good or bad.

They were most usually imagined to be women of an order superior to human nature, yet subject to wants, passions, accidents, and even death; sprightly and benevolent while young and handsome; morose, peevish, and malignant, if ugly, or in the decline of their beauty; fond of appearing in white, whence they are often called the *white ladies*.

Concerning these imaginary beings, no less a person than Jervaise of Tilleberry, marshal of the kingdom of Arles, who lived in the beginning of the 13th century, writes thus in a work inscribed to the emperor Otho IV. "It has been asserted by persons of unexceptionable credit, that fairies used to choose themselves gallants from among men, and rewarded their attachment with an affluence of worldly goods; but if they married, or boasted of a fairy's favours, they as severely smarted for such indiscretion." The like tales still go current in Languedoc; and, throughout the whole province, there is not a village without some ancient seat or cavern which had the honour of being a fairy's residence, or at least some spring where a fairy used to bathe. This idea of fairies has a near affinity with that of the Greeks and Romans, concerning the nymphs of the woods, mountains, and springs; and an ancient scholiast on Theocritus says, "The nymphs are demons which appear on the mountains in the figure of women;" and what is more surprising, the Arabs and other orientals have their *ginn* and *peri*, of whom they entertain the like notions.

But fairies have been likewise described as of either sex, and generally as of minute stature, though capable of assuming various forms and dimensions. The most charming representation imaginable of these children of romantic fancy, is in the *Midsummer-night's Dream* of Shakespear; in referring to which, we will no doubt have been anticipated by the recollection of almost every reader.

Spenser's Fairy Queen is an epic poem, under the persons and characters of fairies. This sort of poetry raises a pleasing kind of horror in the mind of the reader, and amuses his imagination with the strangeness and novelty of the persons who are represented in it; but, as a vehicle of instruction, the judicious object to

Fairford,
Fairy.

Fairy, Faith. it, as not having probability enough to make any moral impression.

The belief of fairies still subsists in many parts of our own country. The

"Swart fairy of the mine,"

(of German extraction), has scarce yet quitted our subterraneous works; (*vid. next article.*) *Puck*, or *Robin Good-Fellow*, still haunts many of our villages. And in the highlands of Scotland, new-born children are watched till the christening is over, lest they should be stolen or changed by some of these phantastical existences.

FAIRY of the Mine; an imaginary being, an inhabitant of mines. The Germans believed in two species; one fierce and malevolent; the other a gentle race, appearing like little old men dressed like the miners, and not much above two-feet high. These wander about the drifts and chambers of the works; seem perpetually employed, yet do nothing; some seem to cut the ore, or fling what is cut into vessels, or turn the windlafs; but never do any harm to the miners, unless provoked; as the sensible *Agricola*, in this point credulous, relates in his book *de Animantibus Subterraneis*.

FAIRY Circle or Ring, a phenomenon pretty frequent in the fields, &c. supposed by the vulgar to be traced by the fairies in their dances. There are two kinds of it; one of about seven yards in diameter, containing a round bare path, a foot broad, with green grass in the middle of it. The other is of different bigness, encompassed with a circumference of grass. Mess. *Jeffop and Walker*, in the *Philosophical Transactions*, ascribe them to lightning; which is thought to be confirmed by their being most frequently produced after storms of that kind, as well as by the colour and brittleness of the grass-roots when first observed. Lightning, like all other fires, moves round, and burns more in the extremity than in the middle: the second circle arises from the first, the grass burnt up growing very plentifully afterwards. Others maintain that these circles are made by ants, which are frequently found in great numbers therein.—Mr *Cavallo*, who hath published an esteemed treatise on electricity, does not think that lightning is at all concerned in the formation of them: "They are not (says he) always of a circular figure; and, as I am informed, they seem to be rather beds of mushrooms than the effects of lightning."

FAITH, in philosophy and theology, that assent which we give to a proposition advanced by another, the truth of which we do not immediately perceive from our own reason or experience; or it is a judgment or assent of the mind, the motive whereof is not any intrinsic evidence, but the authority or testimony of some other who reveals or relates it. Hence, as there are two kinds of authorities and testimonies, the one of God, and the other of man, faith becomes distinguished into divine and human.

Divine FAITH, is that founded on the authority of God; or it is that assent we give to what is revealed by God.

The objects of this faith, therefore, are matters of revelation. See **REVELATION** and **RELIGION**.

Human FAITH, is that whereby we believe what is told us by men. The object hereof is matter of human testimony and evidence. See **METAPHYSICS**.

FAITH, in practical theology, makes the first of the theological virtues or graces.

Faith in God, in this sense, denotes such a conviction of his being, perfections, character, and government, as produces love, trust, worship, obedience, and resignation.

Faith in Christ, as it has been defined by some, is a mere assent to the gospel as true; according to others, it signifies such a persuasion that he is the Messiah, and such a desire and expectation of the blessings which he has promised in his gospel to his sincere disciples, as engage the mind to fix its dependence upon him, and subject itself to him in all the ways of holy obedience. See **THEOLOGY**.

Faith, likewise, in respect to futurity, is a moral principle, implying such a conviction of the reality and importance of a future state, as is sufficient to regulate the temper and conduct.

FAITH, or *Fidelity*, (*Fides*), was deified by the ancient Romans, and had a temple in the Capitol consecrated to her by *Attilius Catalinus*. Her priests wore white veils: unbloody sacrifices were offered to her, and the greatest oaths were taken in her name. Horace clothes her in white, places her in the retinue of Fortune, and makes her the sister of Justice, *Od. 24, 35. l. i.* Public faith is represented in a great number of medals; sometimes with a basket of fruit in one hand, and some ears of corn in the other; and sometimes holding a turtle-dove. But the most usual symbol is two hands joined together. The inscriptions are generally, *Fides Augusti*, *Fides Exercitus*, or *Fides Militum*, &c.

FAITHFUL, an appellation assumed by the Mahometans. See **MAHOMETANS**.

FAITHORN (William), an ingenious English artist, a native of London, was the disciple of Peak the painter, and worked with him three or four years. At the breaking out of the civil war, Peak espoused the cause of his sovereign; and Faithorn, who accompanied his master, was taken prisoner by the rebels at Baringhouse, from whence he was sent to London, and confined in Aldersgate. In this uncomfortable situation he exercised his graver; and a small head of the first Villars duke of Buckingham, in the style of Melan, is reckoned among his performances at that time. The solicitations of his friends in his favour at last prevailed; and he was released from prison, with permission to retire to the continent. In France he found protection and encouragement from the Abbé de Marolles; and at this time it was that he formed an acquaintance with Nanteuil, from whose instructions he derived very considerable advantages. About the year 1650 he returned to England, and soon after married the sister of a Captain Croud. By her he had two sons; Henry, who was a bookseller, and William an engraver in mezzotinto. Faithorn opened a shop near Temple-Bar, where he sold not only his own engravings, but those of other English artists; and imported a considerable number of prints from Holland, France, and Italy. About the year 1680, he retired from his shop, and resided in Printing-House Yard; but he still continued to work for the booksellers, especially Royston, Martin, and Peake the younger, his former master's brother. He painted portraits from the life in crayons; which art

Fakirs. he learned of Nanteuil during his abode in France. He also painted in miniature; and his performances in both these styles were much esteemed. His spirits were broken by the indiscretion and dissipation of his son William; and a lingering consumption put an end to his life in 1691. He wrote a book *Upon Drawing, Graving, and Etching*, for which he was celebrated by his friend Thomas Flatman the poet.

FAKIRS, Indian monks or friars. They out-do the severity and mortification of the ancient Anchorets or Solitaries. Some of them make a vow of continuing all their lifetime in one posture, and keep it effectually. Others never lie down; but continue in a standing posture all their lives, supported only by a stick, or rope under their arm-pits. Some mangle their bodies with scourges and knives. They look upon themselves to have conquered every passion, and triumphed over the world; and accordingly scruple not, as if in a state of innocence, to appear entirely naked in public.

The common people of East India are thoroughly persuaded of the virtue and innocence of the fakirs; notwithstanding which, they are accused of committing the most enormous crimes in private.

They have also another kind of fakirs, who do not practise such severities: these flock together in companies, and go from village to village, prophesying, and telling fortunes. They are wicked villains, and it is dangerous for a man to meet them in a lone place: nevertheless the Indian idolaters have them in the utmost veneration. They make use of drums, trumpets, and other musical instruments, to rouse their souls, and work themselves up to an artificial ecstacy, the better to publish their pretended prophecies.

Some of the votaries of these sages most devoutly kiss their privy parts; and they receive this monstrous declaration of respect with a kind of ecstatic pleasure. The most sober and discreet Indians consult them in this preposterous attitude; and their female votaries converse with them a considerable time with the most indecent freedom.

The fire they burn is made of cow's dung, dried in the sun. When they are disposed to sleep, they repose themselves on cow's dung, and sometimes on ordure itself. They are so indulgent towards every living creature, that they suffer themselves to be over-run with vermin, or stung by insects, without the least reluctance or complaint.

It is more than probable, these Indian friars have some secret art to lull their senses asleep, in order to render themselves in a great measure insensible of the excessive torments they voluntarily undergo. Ovington assures us, that "as he was one day in an assembly of fakirs, he observed, that they drank opiates infused in water; the intoxicating virtue whereof was enough to turn their brain."

The garment of the chief fakirs consists of three or four yards of orange-coloured linen, which they tie round them, and a tyger's skin, which hangs over their shoulders. Their hair is woven in tresses, and forms a kind of turban. The superior of the fakirs is distinguished from the rest by having a greater number of pieces in his garment, and by a chain of iron, two yards long, tied to his leg. When he designs to rest in any place, a garment is spread upon the ground; on which

he sits and gives audience, whilst his disciples publish his virtues.

Some persons of quality in India have become fakirs: among others, five great lords belonging to the court of Chagahan, Mogul of the Indies. It is said, there are about two millions of fakirs in the East Indies.

FALASHA, a people of Abyssinia, of Jewish origin, described by Mr Bruce, who was at great pains to acquaint himself with their history by cultivating the friendship of the most learned persons among them he could meet with.

According to the accounts received from them, the Falasha are the descendants of those Jews who came from Palestine into Ethiopia, as attendants of Menilek the son of the queen of Sheba or Saba by Solomon. They agree in the relations given by the Abyssinians of that prince, which are mentioned under the article **ETHIOPIA**; but deny that the posterity of those who came with Menilek ever embraced the Christian religion, as the Abyssinians say they did. They say, that at the decline of the Jewish commerce, when the ports of the Red Sea fell into the hands of other nations, and no intercourse took place betwixt them and Jerusalem, the Jewish inhabitants quitted the sea-coasts and retired into the province of Dembea. While they remained in the cities on the Red Sea, they exercised the trades of brick and tile making, pottery, thatching houses, &c. and after leaving the sea-coasts, they chose the country of Dembea on account of the plenty of materials it afforded for exercising the trades they professed. Here they carried the art of pottery to a great degree of perfection, multiplied exceedingly, and became very numerous and powerful about the time that the Abyssinians were converted to Christianity. As this event was accounted by them an apostacy from the true religion, they now separated themselves from the Abyssinians, and declared one Phineas, of the line of Solomon, their king. Thus they say, they have still a prince of the house of Judah for their sovereign, though their assertion is treated with contempt, and a nick-name bestowed on the Falashan family by the other Abyssinians. About the year 960, the queen of this people, after extirpating the Abyssinian princes on the rock Damo, assumed the sovereignty of the whole empire, which they retained for some time, as is related under the article **ETHIOPIA**; but their power being by degrees reduced, they were obliged to take up their residence among the rugged mountains of Samen, one of which they chose for their capital, and which has ever since been called the *Jews Rock*. About the year 1600, they were almost entirely ruined by an overthrow from the Abyssinians, in which both their king and queen were slain; since which time they have been in subjection to the emperors of that country, but are still governed by their own princes. When Mr Bruce was in Abyssinia they were supposed to amount to about 100,000 effective men. Gideon and Judith were the names of the king and queen at that time; and these, according to our author, seem to be preferred to others for the royal family.

The language of this people is very different from the Hebrew, Samaritan, or any other which the Jews ever spoke in their own country. On being interrogated

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gated concerning it by Mr Bruce, they said, that it was probably one of those spoken by the nations on the Red Sea, among whom they had settled at their first coming. They arrived in Abyssinia speaking Hebrew, and with the advantage of having books in that language; but had now forgot it, which indeed is not to be wondered at, as they had lost their Hebrew books, and were entirely ignorant of the art of writing. At the time of their leaving Jerusalem, they were in possession both of the Hebrew and Samaritan copies of the law; but when their fleet was destroyed in the time of Rehoboam, and no farther communication with Jerusalem took place, they were obliged to use translations of the scriptures, or those copies which were in possession of the shepherds, who, they say, were all Jews before the time of Solomon. On being asked, however, where the Shepherds got their copy, and being told, that, notwithstanding the invasion of Egypt by Nebuchadnezzar, there was still a communication with Jerusalem by means of the Ishmaelite Arabs through Arabia, they frankly acknowledged that they could not tell; neither had they any memorials of the history either of their own or any other country; all that they believed in this case being derived from mere tradition, their histories, if any existed, having been destroyed by the famous Moorish Captain Gagné, of whom an account is given under the article ETHIOPIA. They say, that the first book of Scripture they ever received was that of Enoch; and they place that of Job immediately after it, supposing that patriarch to have lived soon after the flood. They have no copy of the Old Testament in the Falasha language, what they make use of being in that of Geez. This is sold to them by the Abyssinian Christians, who are the only scribes in that country. No difference takes place about corruptions of the text; nor do the Falasha know any thing of the Jewish Talmud, Targum, or Cabala.

FALCADE, in the manege, the motion of a horse when he throws himself upon his haunches two or three times, as in very quick curvets; which is done in forming a stop and half stop. See STOP.

FALCATED, something in the form of a sickle: thus, the moon is said to be *falcated* when she appears horned.

FALCO, in ornithology, a genus belonging to the order of accipitres, the characters of which are these: The beak is crooked, and furnished with wax at the base: the head is thick-set with feathers, and the tongue is cloven. The eagle and hawk form this genus.

CXC. 1. The leucocephalus, bald, or white-headed eagle of Catesby, is ash-coloured, with the head and tail white; the iris of the eye is white, over which is a prominence covered with a yellow skin; the bill and the cere or wax are yellow, as are likewise the legs and feet; and the talons are black. Though it is an eagle of small size, it weighs nine pounds, is strong and full of spirit, preying on lambs, pigs, and fawns. They always make their nests near the sea or great rivers, and usually upon old dead pine or cypress trees, continuing to build annually on the same tree till it falls. Though he is so formidable to all birds, yet he suffers them to build near his royal nest without molestation; particularly the fishing hawk, herons, &c. which all build on high trees, and in some places are so near one

another, that they appear like a rookery. The nests are very large and very fetid by reason of the reliëts of their prey. Lawson says they breed very often, laying again under their callow young; whose warmth hatches the eggs. In Bering's Isle they make their nests on the cliffs near six feet wide and one thick; and lay two eggs in the beginning of July. This species inhabits both Europe and America; but is more common in the latter. Besides flesh, it feeds also on fish. This, however, it does not procure for itself; but sitting in a convenient spot, watches the diving of the osprey into the water after a fish, which the moment it has seized the bald eagle follows close after, when the osprey is glad to escape by dropping the fish from his bill; and such is the dexterity of the former, that it often seizes the prey before it can fall to the ground. Catesby says the male and female are much alike.

2. The *officragus*, or sea-eagle, with yellow wax, and half-feathered legs; it is about the size of a peacock; the feathers are white at the base, iron-coloured in the middle, and black at the points; and the legs are yellow. It is found in several parts of Great Britain and Ireland. Mr Willoughby tells us, that there was an æry of them in Whinfield Park, Westmoreland; and the bird soaring in the air with a cat in its talons (which Barlow drew from the very fact which he saw in Scotland), is of this kind. The cat's resistance brought both animals to the ground, when Barlow took them up; and afterwards caused the event to be engraved in the 36th plate of his Collection of Prints. Turner says, that in his days this bird was too well known in England; for it made horrible destruction among the fish. All authors indeed agree, that it feeds principally on fish, which it takes as they are swimming near the surface, by darting itself down upon them; not by diving or swimming, as some authors have pretended, who furnish it for that purpose with one webbed foot to swim with, and another divided foot to take its prey with. Martin, speaking of what he calls the great eagles of the Western Isles, says, that they fasten their talons in the back of the fish, commonly of salmon, which are often above the water, or very near the surface. Those of Greenland will even take a young seal out of the water. Turner, above mentioned, says, that the fishermen were fond of anointing their baits with the fat of this bird, imagining that it had a peculiar alluring quality: they were even superstitious enough to believe, that whenever the sea-eagle hovered over a piece of water, the fish (as if charmed) would rise to the surface with their bellies upwards; and in that manner present themselves to him. It also preys on water-fowl. This species is also frequent in North America, and was also met with in Botany Island by Captain Cooke.

3. The *chrysaetos*, or golden eagle, weighs about 12 pounds, and is in length about three feet, the wings when extended measuring about seven feet four inches. The sight and sense of smelling are very acute: the head and neck are clothed with narrow, sharp-pointed feathers, of a deep brown colour bordered with tawney; the hind part of the head in particular is of a bright rust colour. These birds are very destructive to fawns, lambs, kids, and all kinds of game; particularly in the breeding season, when they bring a vast quantity

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tity of prey to their young. Smith, in his History of Kerry, relates, that a poor man in that country got a comfortable subsistence for his family, during a summer of famine, out of an eagle's nest, by robbing the eaglets of the food the old ones brought; whose attendance he protracted beyond the natural time, by clipping the wings and retarding the flight of the former. It is very unsafe to leave infants in places where eagles frequent; there being instances in Scotland of two being carried off by them; but, fortunately, the theft was discovered in time, and the children were restored unhurt out of the eagles nests. In order to extirpate these pernicious birds, there is a law in the Orkney isles, which intitles every person that kills an eagle to a hen out of every house in the parish where it was killed. Eagles seem to give the preference to the carcases of dogs and cats. People who make it their business to kill those birds, lay one or other of these carcases by way of bait; and then conceal themselves within gunshot. They fire the instant the eagle alights; for she, that moment, looks about before she begins to prey. Yet, quick as her sight may be, her sense of hearing seems still more exquisite. If hooded crows or ravens happen to be nearer the carrion, and resort to it first, and give a single croak, the eagle is certain of instantly repairing to the spot.

Eagles are remarkable for their longevity, and for their power of sustaining a long abstinence from food. Mr Keyser relates, that an eagle died at Vienna after a confinement of 104 years. This pre-eminent length of days probably gave occasion to the saying of the Psalmist, "Thy youth is renewed like the eagle's." One of this species, which was nine years in the possession of Owen Holland, Esq; of Conway, lived 32 years with the gentleman who made him a present of it; but what its age was when the latter received it from Ireland is unknown. The same bird also furnishes us with a proof of the truth of the other remark; having once, through the neglect of servants, endured hunger for 21 days without any sustenance whatever.

4. The fulvus, or white-tailed eagle of Edwards, has the whole plumage of a dusky brown: the breast marked with triangular spots of white, but which are wanting in the British kind: the tail is white, tipped with black; but in young birds dusky, blotched with white: the legs are covered to the toes with soft rust-coloured feathers. These birds inhabit Hudson's Bay and northern Europe as far as Drontheim. They are found on the highest rocks of the Uralian chain, where it is not covered with wood; but are most frequent on the Siberian, where they make their nest on the loftiest rocks. They are rather inferior in size to the sea-eagle; but are generous, spirited, and docile. The independent Tartars train them for the chase of hares, foxes, antelopes, and even wolves. The use is of considerable antiquity; for Marco Polo, the great traveller of 1269, observed and admired the diversion of the great cham of Tartary; who had several eagles, which were applied to the same purposes as they are at present. The Tartars also esteem the feathers of the tail as the best they have for pluming their arrows. This species is frequent in Scotland; where it is called the *black eagle*, from the dark colour of its plumage. It is very destructive to deer, which it will seize between the horns; and by incessantly beating it about the

eyes with its wings, soon makes a prey of the harassed animal. The eagles in the isle of Rum have nearly extirpated the stags that used to abound there. They generally build in clefts of rocks near the deer-forests; and make great havoc not only among them, but also among the white hares and ptarmigans. Mr Willoughby gives the following curious account of the nest of this species. "In the year of our Lord 1668, in the woodlands near the river Darwent, in the peak of Derbyshire, was found an eagle's nest made of great sticks, resting one end on the edge of a rock, the other on two birch trees; upon which was a layer of rushes, and over them a layer of heath, and upon the heath rushes again; upon which lay one young one and an addle egg; and by them a lamb, a hare, and three heath poults. The nest was about two yards square, and had no hollow in it. The young eagle was black as a hobby, of the shape of a gohawk, almost of the weight of a goose, rough-footed, or feathered down to the foot: having a white ring about the tail."

5. The cyaneus, or hen-harrier, with white wax, yellow legs, a whitish blue body, and a white ring round the eyes and throat. It is the blue hawk of Edwards, and is a native of Europe and Africa. These birds are extremely destructive to young poultry and to the feathered game: they fly near the ground, skimming the surface in search of prey. They breed on the ground, and never are observed to settle on trees.

6. The albiulla, or cinereous eagle, is inferior in size to the golden eagle; the head and neck are of a pale ash-colour; the body and wings cinereous, clouded with brown; the quill feathers very dark; the tail white; the legs feathered but little below the knees, and of a very bright yellow. The male is of a darker colour than the female. The bill of this species is rather straighter than is usual in the eagle; which seems to have induced Linnæus to place it among the *vultures*. But Mr Pennant observes, that it can have no title to be ranked with that genus, the characteristic mark of which is, that the head and neck are either quite bare, or only covered with down; whereas this bird is wholly feathered. This species is in size equal to the black eagle, and inhabits Europe as high as Iceland and Lapmark. It is common in Greenland, but does not extend to America; or, according to Mr Pennant, if it does, it varies into the white-headed eagle, to which it has great affinity, particularly in its feeding much on fish; the Danes therefore call it *Fiske-orn*. It is common in the south of Russia, and about the Volga, as far as trees will grow; but is very scarce in Siberia. It inhabits Greenland the whole year, sitting on the rocks with flagging wing, and flies slowly. It makes its nest on the lofty cliffs, with twigs, lining the middle with mosses and feathers; lays two eggs; and sits in the latter end of May or beginning of June. These birds prey on young seals, which they seize as they are floating on the water; but oft-times, by fixing their talons in an old one, they are overmatched, and drawn down to the bottom, screaming horribly. They feed also on fish, especially the lumpfish, and a sort of trout; on ptarmigans, auks, and eider ducks. They sit on the top of rocks, attentive to the motion of the diving birds; and with quick eyes observe their course by the bubbles which rise to the surface of the water, and catch the fowls as they rise for

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falcon. for breath. The Greenlanders use their skins for cloathing next to their bodies; eat the flesh; and keep the bill and feet for amulets. They kill them with the bow; or take them in nets placed in the snow properly baited; or tempt them by the fat of seals, which the eagles eat to an excess; which occasions such a torpidity as to make them an easy prey. They are common in Scotland and the Orkneys; where they feed on fish, as well as on land animals.

7. The crying eagle (Arct. Zool. p. 215.), with a dusky bill and yellow cere; the colour of the plumage is a ferruginous brown; the coverts of the wings and scapulars are elegantly varied with oval white spots; the primaries dusky, the ends of the greater white; the breast and belly are of a deeper colour than the rest of the plumage, streaked downwards with dull yellow; the tail is dark brown, tipped with dirty white; the legs are feathered to the feet, which are yellow. The length of the bird is two feet.—This species is found in many parts of Europe, but not in Scandinavia; is frequent in Russia and Siberia; and extends even to Kamtschatka. It is less generous and spirited than other eagles, and is perpetually making a plaintive noise; from which it was styled by the ancients *Hift. planga* & *clanga**; and *anataria*, from its preying on ducks, which Pliny† describes with great elegance. *lib. 9* *ib. x. c. 3.* The Arabs used to train it for the chase; but its quarry was cranes and other birds; the more generous eagle being flown at antelopes and various quadrupeds. This species was itself an object of diversion, and made the game of even so small a falcon as the sparrow hawk; which would pursue it with great eagerness, soar above, then fall on it, and fastening with its talons, keep beating it about the head with its wings, till they both fell together to the ground. This Sir John Chardin has been practised about Tauris.

8. The milvus, or kite, is a native of Europe, Asia, and Africa. This species generally breeds in large forests or woody mountainous countries. Its nest is composed of sticks, lined with several odd materials, such as rags, bits of flannel, rope, and paper. It lays two, or at most three, eggs; which, like those of other birds of prey, are much rounded and blunt at the smaller end. They are white, spotted with dirty yellow. Its motion in the air distinguishes it from all other birds, being so smooth and even that it is scarce perceptible. Sometimes it will remain quite motionless for a considerable space; at others glide through the sky without the least apparent action of its wings; from thence deriving the old name of *glead* or *glede*, from the Saxon *glida*. They inhabit the north of Europe, as high as Jarlsberg, in the very south of Norway; but do not extend farther. They quit Sweden in flocks at the approach of winter, and return in spring. Some of them winter about Astrakan, in lat. 46. 30: but the far greater part are supposed to retire into Egypt, being seen in September passing by Constantinople in their way from the north; and again in April returning to Europe, to shun the great heats of the east. They are observed in vast numbers about Cairo, where they are extremely tame, and feed even on dates, probably for want of other food. They also breed there; so that, contrary to the nature of other rapacious birds, they increase and multiply twice in the year; once in the mild winters of Egypt, and a second

time in the summers of the north. It makes its appearance in Greece in the spring; and in the early ages, says Aristophanes, “it governed that country; and men fell on their knees when they were first blessed with the sight of it, because it pronounced the flight of winter, and told them to begin to shear their vernal fleeces.” In Britain they are found the whole year. Lord Bacon observes, that when kites fly high, it portends fair and dry weather.

9. The gentilis, or gentil falcon, inhabits the north of Scotland, and was in high esteem as a bold and spirited bird in the days of falconry. It makes its nest in rocks: it is larger than the gohawk; the head of a light rust colour, with oblong black spots; the whole under side from chin to tail white, tinged with yellow; the back of a brown colour; the tail barred with four or five bars of black, and as many of ash-colour; the very tips of all the tail-feathers white.

10. The subbuteo, or hobby, was used like the kestrel in the humbler kind of falconry; particularly in what was called *daring of larks*: the hawk was cast off; the larks, aware of their most inveterate enemy, were fixed to the ground for fear; by which means they became a ready prey to the fowler, by drawing a net over them. The back of this bird is brown; the nape of the neck white; and the belly pale, with oblong brown spots. It is a bird of passage; but breeds in Britain, and migrates in October.

11. The buteo, or buzzard, is the most common of the hawk kind in England. It breeds in large woods; and usually builds on an old crow's nest, which it enlarges, and lines with wool and other soft materials. It lays two or three eggs, which are sometimes perfectly white, sometimes spotted with yellow. The cock buzzard will hatch and bring up the young if the hen is killed. The young keep company with the old ones for some little time after they quit the nest; which is not usual with other birds of prey, who always drive away their brood as soon as they can fly. This species is very sluggish and inactive, and is much less in motion than other hawks; remaining perched on the same bough for the greatest part of the day, and is found at most times near the same place. It feeds on birds, rabbits, moles, and mice; it will also eat frogs, earthworms, and insects. This bird is subject to some variety in its colour. Some have their breast and belly of a brown colour, and are only marked cross the craw with a large white crescent; but usually the breast is of a yellowish white, spotted with oblong rust-coloured spots, pointing downwards: the back of the head, neck, and coverts of the wings, are of a deep brown, edged with a pale rust-colour: the middle of the back covered only with a thick white down. The tail is barred with black, and ash-colour, and sometimes with ferruginous.

12. The tinnunculus, or kestrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruined buildings. It feeds on field-mice, small birds, and insects; which it will discover at a great distance. This is the hawk that we so frequently see in the air fixed in one place; and, as it were, fanning it with its wings; at which time it is watching for its prey. When falconry was in use in Great Britain, this bird was trained for catching small birds and young partridges. It is easily distinguished from all other hawks

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by its colours. The crown of the head and the greater part of the tail are of a fine light grey; the back and coverts of the wing of a brick-red, elegantly spotted with black; the whole under side of the bird of a pale rust-colour spotted with black.

13. The suttator, with yellowish wax and legs; the body is of a brownish white colour; and the covers of the eyes are bony. He has a fleshy lobe between the nostrils; which when angry or terrified, he inflates till his head becomes as big as his whole body. He is a native of Surinam.

14. The cachinnans, or laughing hawk, has yellowish legs and wax, and white eye-brows; the body is variegated with brown and white; and it has a black ring round the top of the head. It makes a laughing kind of noise when it observes any person, and is a native of America.

15. The columbarius, or pigeon-hawk of Catesby, weighs about six ounces. The bill is black at the point, and whitish at the base; the iris of the eye is yellow; the base of the upper mandible is covered with a yellow cere or wax; all the upper part of the body, wings, and tail, are brown. The interior vanes of the quill-feathers have large red spots. The tail is marked with large regular transverse white lines; the throat, breast, and belly, are white; mixed with brown; the small feathers that cover the thighs reach within half an inch of the feet, and are white, with a tincture of red, beset with long spots of brown; the legs and feet are yellow. It inhabits America, from Hudson's Bay as low as South Carolina. In the last it attains to a larger size. In Hudson's Bay it appears in May on the banks of Severn river, breeds, and retires south in autumn. It feeds on small birds; and on the approach of any person, flies in circles, and makes a great shrieking. It forms its nest in a rock, or some hollow tree, with sticks and grass; and lines it with feathers: and lays from two to four eggs, white, spotted with red. In Carolina it preys on pigeons, and young of the wild turkeys.

16. The furcatus, or swallow-tailed hawk, has a black bill, less hooked than usual with rapacious birds: the eyes are large and black, with a red iris: the head, neck, breast, and belly, are white; the upper part of the back and wings a dark purple; but more dusky towards the lower parts, with a tincture of green. The wings are long in proportion to the body, and, when extended, measure four feet. The tail is dark purple mixed with green, and remarkably forked. This most elegant species inhabits only the southern parts of North America; and that only during summer. Like swallows, they feed chiefly flying; for they are much on wing, and prey on various sorts of insects. They also feed on lizards and serpents; and will kill the largest of the regions it frequents with the utmost ease. They quit North America before winter, and are supposed to retreat to Peru.

17. *Haliaetus*, the fishing-hawk of Catesby, or the osprey, weighs three pounds and a quarter; it measures, from one end of the wing to the other, five feet and a half. The bill is black, with a blue cere or wax; the iris of the eye is yellow, and the crown of the head brown, with a mixture of white feathers; from each eye, backwards, runs a brown stripe: the

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back, wings, and tail, are of a dark brown; the throat, neck, and belly, white; the legs and feet are rough and scaly, and of a pale blue colour; the talons are black, and nearly of an equal size; the feathers of the thighs are short, and adhere close to them, contrary to others of the hawk kind, which nature seems to have designed for the more easily penetrating the water. Notwithstanding the osprey is so persecuted by the bald eagle, yet it always keeps near its haunts. It is a species of vast quickness of sight; and will see a fish near the surface from a great distance: descend with prodigious rapidity, and carry the prey with an exulting scream high into the air. The eagle hears the note, and instantly attacks the osprey; who drops the fish, which the former catches before it can reach the ground or water. The lower parts of the rivers and creeks near the sea in America, abound with these eagles and hawks, where such diverting contests are often seen. It sometimes happens that the osprey perishes in taking its prey; for if it chances to fix its talons in an over-grown fish, it is drawn under water before it can disengage itself, and is drowned.

18. The Iceland falcon (*G. Mag.* 1771, p. 297), or *gyrfalco Lin.* has a strong bill, much hooked, the upper mandible sharply angulated on the lower edges, with a bluish wax: the head is of a very pale rust-colour, streaked downwards with dusky lines: the neck, breast, and belly, are white, marked with cordated spots; the thighs white, crossed with short bars of deep brown: the back and coverts of the wings are dusky, spotted and edged with white; the exterior webs of the primaries dusky mottled with reddish white, the inner barred with white: the feathers of the tail are crossed with 14 or more narrow bars of dusky and white; the dusky bars regularly opposing those of white: the wings, when closed, reach almost to the end of the train: legs are strong and yellow. The length of the wing, from the pinion to the tip is 16 inches.—This species is an inhabitant of Iceland, and is the most esteemed of any for the sport of falconry.

19. The fuscus, or Greenland falcon, has dusky irides; lead-coloured wax and feet; brown crown, marked with irregular oblong white spots; whitish forehead, blackish cheeks; the hind part of the head and throat white; breast and belly of a yellowish white, striped downwards with dusky streaks; the back dusky, tinged with blue, the ends of the feathers lightest, and sprinkled over with a few white spots, especially towards the rump; the wings of the same colours, variegated beneath with white and black; the upper part of the tail dusky crossed very faintly with paler bars, the under side whitish. It inhabits all parts of Greenland, from the remotest hills to those which impend over the sea. They are even seen on the islands of ice remote from shore. They retire in the breeding-season to the farthest part of the country, and return in autumn with their young. They breed in the same manner as the cinereous eagle, but in more distant places; and lay from three to five eggs. The tail of the young is black, with great brown spots on the exterior webs. They prey on ptarmigans, auks, and all the small birds of the country. They have frequent disputes with the raven, but seldom come off victors;

for

Falcon.

for the raven will, on being attacked, fling itself on its back; and either by defending itself with its claws, or by calling, with its croaking, numbers of others to its help, oblige the falcon to retire. The Greenlanders use the skin, among others, for their inner garments; the wings for brushes; the feet for amulets: but seldom eat the flesh, unless compelled by hunger.

20. The gyrfalcon (Br. Zool. n° 47.) has a yellow wax; the bill bluish, and greatly hooked; the eye dark blue; the throat of a pure white: the whole body, wings, and tail, of the same colour, most elegantly marked with dusky bars, lines, or spots, leaving the white the far prevailing colour. There are instances, but rare, of its being found entirely white. In some, the whole tail is crossed by remote bars of black or brown; in others, they appear only very faintly on the middle feathers: the feathers of the thighs are very long and unspotted: the legs strong, and of a light blue. Its weight is 45 ounces Troy; length, near two feet; extent, four feet two. This species has the same manners and haunts with the former. It is very frequent in Iceland; is found in Lapmark and Norway; and rarely in the Orkneys and North Britain. In Asia, it dwells in the highest points of the Uralian and other Siberian mountains, and dares the coldest climates throughout the year. It is kept in the latitude of Petersburg, uninjured in the open air during the severest winters.—This species is pre-eminent in courage as well as beauty, and is the terror of other hawks. It was flown at all kinds of fowl, how great soever they were; but its chief game used to be herons and cranes.

The three last species are in high esteem for sport. They are reserved for the kings of Denmark; who send their falconer with two attendants annually into Iceland to purchase them. They are caught by the natives; a certain number of whom in every district are licensed for that purpose. They bring all they take, about midsummer, to Besset, to meet the royal falconer; and each brings 10 or 12, capped, and perched on a cross pole, which they carry on horseback and rest on the stirrup. The falconer examines the birds, rejects those which are not for his purpose, and gives the seller a written certificate of the qualities of each, which intitles him to receive from the king's receiver-general seventeen rixdollars for the purest white falcon (n° 20.), ten for n° 19. or those which are least white; and seven for n° 18. This brings into the island between 2000 and 3000 rixdollars annually. They are taken in the following manner:—Two posts are fastened in the ground, not remote from their haunts. To one is tied a ptarmigan, a pigeon, a cock or hen, fastened to a cord that it may have means of fluttering, and so attract the attention of the falcon. On the other post is placed a net, distended on a hoop, about six feet in diameter. Through this post is introduced a string, above 100 yards long, which is fastened to the net, in order to pull it down; and another is fastened to the upper part of the hoop, and goes through the post to which the bait is tied. As soon as the falcon sees the fowl flutter on the ground, he takes a few circles in the air, to see if there is any danger, then darts on its prey with such violence as to strike off the head, as nicely as if it was done with a razor. He then usually rises again, and takes another circle,

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to explore the place a second time: after which it makes another stoop; when, at the instant of its descending, the man pulls the dead bird under the net; and, by means of the other cord, covers the falcon with the net at the moment it has seized the prey; the person lying concealed behind some stones, or else lies flat on his belly, to elude the sight of the falcon. As soon as one is caught, it is taken gently out of the net, for fear of breaking any of the feathers of the wings or tail; and a cap is placed over its eyes. If any of the tail-feathers are injured, the falconers have the art of grafting others; which sometimes has occasioned a needless multiplication of species.

The Iceland falcons are in the highest esteem. They will last 10 or 12 years; whereas those of Norway, and other countries, seldom are fit for sport after two or three years use. Yet the Norwegian hawks were in old times in great repute in this kingdom, and even thought bribes worthy of a king. Geoffry Le Pierre, chief justiciary, gave two good Norway hawks to King John, that Walter Le Madina might have leave to export 100 weight of cheese. John the son of Ordgar, gave a Norway hawk to have the king's request to the king of Norway, to let him have his brother's chattels; and Ralf Havoc fined to King Stephen in two girls (gyrfalcons) and two Norway hawks, that he might have the same acquittance that his father had.

21. The *aviporus*, with black wax, yellow legs, half naked, the head of an ash colour, and having an ash-coloured stripe on the tail, which is white at the end. It is the honey-buzzard of Ray, and had its name from the combs of wasps being found in its nest. It is a native of Europe, and feeds on mice, lizards, frogs, bees, &c. It runs very swiftly, like a hen.

22. The *æuginofus*, or moor-buzzard, with greenish wax, a greyish body, the top of the head, nape of the neck, and legs, yellowish; is a native of Europe, and frequents moors, marshy places, and heaths: it never soars like other hawks; but commonly sits on the ground or on small bushes. It makes its nest in the midst of a tuft of grass or rushes. It is a very fierce and voracious bird; and is a great destroyer of rabbits, young wild-ducks, and other water-fowl. It preys, like the osprey, on fish.

23. The *palumbarius*, with black wax edged with yellow; yellow legs, a brown body, the prime feathers of the tail marked with pale streaks, and the eye-brows white. It is the goshawk of Ray; and was formerly in high esteem among falconers, being flown at cranes, geese, pheasants, and partridges. It breeds in Scotland, and builds its nest in trees. It is very destructive to game, and dashes through the woods after its quarry with vast impetuosity; but if it cannot catch the object of its pursuit almost immediately, desists, and perches on a bough till some new game presents itself.—This species is common in Muscovy and Siberia. They extend to the river Amur; and are used by the emperor of China in his sporting progresses, attended by his grand falconer, and 1000 of the subordinate. Every bird has a silver plate fastened to its foot, with the name of the falconer who had the charge of it; that in case it should be lost, it might be brought to the proper person: but if he could not be found, the bird is delivered to another officer, called the *guardian of lost birds*; who keeps it till it is demanded

Falcon.

Falcon

manded by the falconer to whom it belonged. That this great officer may the more readily be found among the army of hunters who attend the emperor, he erects a standard in the most conspicuous place.

24. The nifus, or sparrow-hawk, with green wax, yellow legs, a white belly undulated with grey, and the tail marked with blackish belts. This is the most pernicious hawk we have; and makes great havoc among pigeons as well as partridges. It builds in hollow trees, in old nests of crows, large ruins, and high rocks: it lays four white eggs, encircled near the blunter end with red specks.

25. The minutus, with white wax, yellow legs, and the body white underneath. It is the least hawk of Brissons, being about the size of a thrush; and is found on the island Melita.

There are near 100 other species distinguished by ornithologists. Among these are two described by Mr Bruce; one of which deserves particular notice here, as being not only the largest of the eagle kind, but, in our author's opinion, the largest bird that flies. He calls it the *golden eagle*; by the natives it is vulgarly called *abon dachn*, or *father long-beard*. It is not an object of any chase, nor stood in need of any stratagem to bring it within reach. Upon the highest top of the mountain Lamalmon, while Mr Bruce's servants were refreshing themselves from that toilsome rugged ascent, and enjoying the pleasure of a most delightful climate, eating their dinner in the outer air with several large dishes of boiled goats-flesh before them, this eagle suddenly made its appearance; he did not stoop rapidly from a height, but came flying slowly along the ground, and sat down close to the meat within the ring the men had made round it. A great shout, or rather cry of distress, which they raised, made the bird stand for a minute as if to recollect himself, while the servants ran for their lances and shields. His attention was fully fixed upon the flesh. He put his foot into the pan where was a large piece in water prepared for boiling; but finding the smart which he had not expected, he withdrew it, and forsook the piece which he held. There were two large pieces, a leg and a shoulder, lying upon a wooden platter; into these he trussed both his claws and carried them off; skimming slowly along the ground as he had come, till he disappeared behind a cliff. But being observed at his departure to look wistfully at the large piece which remained in the warm water, it was concluded that he would soon return: in expectation of which Mr Bruce loaded a rifle-gun with ball, and sat down close to the platter by the meat. It was not many minutes before he came, and a prodigious shout was raised by the attendants, "He is coming, he is coming!" enough to have discouraged a less courageous animal. Whether it was not quite so hungry as at the first visit, or suspected something from Mr Bruce's appearance, it made a small turn, and sat down about ten yards from him, the pan with the meat being between them. In this situation Mr Bruce fired, and shot him with the ball through the middle of his body about two inches below the wing, so that he lay down upon the grass without a single flutter. Upon laying hold of his monstrous carcase, our author was not a little surprised at seeing his hands covered and tinged with yellow powder or dust. Upon turning him upon his belly, and examining the feathers of his back, they produced a brown dust, the colour

of the feathers there. This dust was not in small quantities; for upon striking his breast, the yellow powder flew in fully greater quantity than from a hair-dresser's powder puff. The feathers of the belly and breast, which were of a gold colour, did not appear to have any thing extraordinary in their formation, but the large feathers in the shoulder and wings seemed apparently to be fine tubes, which upon pressure scattered this dust upon the finer part of the feather, but this was brown, the colour of the feathers of the back. Upon the side of the wing, the ribs, or hard part of the feather, seemed to be bare as if worn, or, in our author's opinion, were rather renewing themselves, having before failed in their function. What is the reason of this extraordinary provision of nature, our author does not pretend to determine. But as it is an unusual one, it is probably meant, he thinks, for a defence against the climate in favour of those birds which live in those almost inaccessible heights of a country doomed even in its lower parts to several months of excessive rain. According to Mr Bruce's description, this bird, from wing to wing, was 8 feet 4 inches; from the tip of his tail to the point of his beak when dead, 4 feet 7 inches. He was remarkably short in the legs, being only four inches from the joining of the foot to where the leg joins the thigh, and from the joint of the thigh to the joining of his body six inches. The thickness of his thigh was little less than four inches; it was extremely muscular, and covered with flesh. His middle claw was about two inches and a half long, not very sharp at the point, but extremely strong. From the root of the bill to the point was three inches and a quarter, and one inch and three quarters in breadth at the root. A forked brush of strong hair, divided at the point into two, proceeded from the cavity of his lower jaw at the beginning of his throat. His eye was remarkably small in proportion to his bulk, the aperture being scarcely half an inch. The crown of his head was bare or bald, as was also the front where the bill and skull joined.

FALCON, or FAUCON, a bird of prey of the hawk kind, superior to all others for courage, docility, gentleness, and nobleness of nature*. Several authors take * See Falcon. the name *falcon* to have been occasioned by its crooked talons or pounces, which resemble a falx or sickle. Giraldus derives it a *falcando*, because it flies in a curve.

The falcon, or falcon gentle, is both for the fit and for the lure. In the choice, take one that has wide nostrils, high and large eye-lids, a large black eye; a round head, somewhat full on the top; barb feathers on the clap of the beaks, which should be short, thick, and of an azure colour; the breast large, round, and fleshy; and the thighs, legs, and feet, large and strong; with the fear of the foot soft and bluish: the pounces should be black, with wings long and crossing the train, which should be short and very pliable.

The name *falcon* is restrained to the female: for the male is much smaller, weaker, and less courageous, than the female; and therefore is denominated *tassel*, or *tircelet*. The falcon is excellent at the river, brook, and even field; and flies chiefly at the larger game, as wild-geese, kite, crow, heron, crane, pye, shoveler, &c. For further particulars, see FALCONRY, HAWK, and HAWKING.

The custom of carrying a falcon extended to many coun

Falcon, Falcon.

Falconer,
Falconry.

countries, and was esteemed a distinction of a man of rank. The Welsh had a saying, that you may know a gentleman by his hawk, horse, and grehound. In fact, a person of rank seldom went without one on his hand. Harold, afterwards king of England, is painted going on a most important embassy, with a hawk on his hand and a dog under his arm. Henry VI. is represented at his nuptials, attended by a nobleman and his falcon. Even the ladies were not without them in earlier times; for in an ancient sculpture in the church of Milton Abbas, in Dorsetshire, appears the consort of king Athelstan with a falcon on her royal fist tearing a bird.

FALCONER, a person who brings up, tames, and makes, that is, tutors and manages, birds of prey; as falcons, hawks, &c. See **FALCONRY**.

The grand seignior usually keeps 6000 falconers in his service.—The French king has a grand falconer, which is an office dismembered from that of great hunt, *grand venur*. Historians take notice of this post as early as the year 1250.

A falconer should be well acquainted with the quality and mettle of his hawks, that he may know which of them to fly early and which late. Every night after flying he should give them casting; one while plumage, sometimes pellets of cotton, and at another time physic, as he finds necessary. He ought also every evening to make the place clean under the porch, that by her casting he may know whether she wants scouring upwards or downwards. Nor must he forget to water his hawk every evening, except on such days as she has bathed; after which, at night, she should be put into a warm room, having a candle burning by her, where she is to sit unhooded, if she be not ramage, that she may pick and prune herself.—A falconer should always carry proper medicines into the field, as hawks frequently meet with accidents there. Neither must he forget to take with him any of his hawking implements; and it is necessary he should be skilful in making lures, hoods of all sorts, jesses, bewets, and other furniture. Neither ought he to be without his coping irons, to cope his hawk's beak when overgrown, and to cut her pounces and talons as there shall be occasion: nor should his cauterizing irons be wanting.

FALCONER (William), an ingenious Scots sailor, who, about the year 1762, came up to London with a pretty pathetic poem, called the *Shipwreck*, founded on a disaster of his own experience. The publication of this piece recommended him to the late duke of York; and he would in all probability have been suitably preferred, if a second shipwreck, as may be supposed, had not proved fatal to him, and to many gentlemen of rank and fortune with whom he sailed. In 1760, he went out a volunteer in the *Aurora* frigate sent to carry Messrs Vanfittart, Scrafton, and Ford, the supervisors appointed to regulate our East India settlements; which vessel, after it had touched at the Cape of Good Hope, was never more heard of. Before his departure, he published a very useful *Marine Dictionary*, in 1 vol. 4to.

FALCONRY, the art of training all manner of hawks, but more especially the larger ones called *falcons*, to the exercise of hawking. See **HAWKING**.

When a falcon is taken, she must be feeded in such

a manner, that, as the feeling slackens, she may see what provision lies before her; but care ought to be taken, not to feel her too hard. A falcon or hawk newly taken should have all new furniture, as new jesses of good leather, mailed leashes with buttons at the end, and new bewets. There should also be provided a small round stick, to stroke the hawk; because, the oftener this is done, the sooner and better will she be manned. She must also have two good bells, that she may be found when she scattereth. Her hood should be well fashioned, raised, and embossed against her eyes, deep, and yet strait enough beneath, that it may fasten about her head without hurting her; and her beak and talons must be a little coped, but not so near as to make them bleed.

If it be a soar-falcon, which hath already passed the seas, she will indeed be harder to reclaim, but will prove the best of falcons. Her food must be good and warm, and given her twice or thrice a-day, till she be full gorged: the best for this purpose is pigeons, larks, or other live birds; because she must be broken off by degrees from her accustomed feeding. When she is fed, you must hoop and lure, as you do when you call a hawk, that she may know when you intend to give her meat. On this occasion she must be unhooded gently; and after giving her two or three bits, her hood must be put on again, when she is to get two or three bits more. Care must be taken that she be close feeded; and after three or four days, her diet may be lessened: the falconer setting her every night to perch by him, that he may awaken her often in the night. In this manner he must proceed, till he find her to grow tame and gentle; and when she begins to feed eagerly, he may give her a sheep's heart. He may now begin to unhood her in the day-time; but it must be far from company, first giving her a bit or two, then hooding her gently, and giving her as much more. When she is sharp set, he may now unhood her, and give her some meat just against his face and eyes, which will make her less afraid of the countenances of others. She must be borne continually on the fist, till she is properly manned, causing her to feed in company, giving her in the morning, about sun-rise, the wing of a pullet; and in the evening, the foot of a hare or coney, cut off above the joint, stead and laid in water, which being squeezed, is to be given her with the pinion of a hen's wing. For two or three days give her washed meat, and then plumage in more or less quantity as she is thought to be more or less foul within. After this, being hooded again, she is to get nothing till she has gleamed and cast, when a little hot meat may be given her in company; and, towards evening, she may be allowed to plume a hen's wing in company also. Cleanse the feathers of her casting, if foul and slimy; if she be clean within, give her gentle castings; and when she is reclaimed, manned, and made eager and sharp set, he may venture to feed her on the lure.

However, three things are to be considered before the lure be showed her, 1. That she be bold and familiar in company, and not afraid of dogs and horses. 2. Sharp set and hungry, having regard to the hour of morning and evening, when you would lure her. 3. Clean within, and the lure well garnished with meat on both sides; and when you intend to give her the length of a leash, you must abscond yourself.

Falconry.

Falconry
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Falisci.

She must also be unhooded, and have a bit or two given her on the lure as she sits on your fist; afterwards take the lure from her, and hide it that she may not see it; and when she is unfeeling, cast the lure so near her, that she may catch it within the length of her leash, and as soon as she has seized it, use your voice as falconers do, feeding her upon the lure, on the ground, with the heart and warm thigh of a pullet.

Having so lured your falcon, give her but little meat in the evening; and let this luring be so timely, that you may give her plumage, and a juck of a joint next morning on your fist. When she has cast and gleamed, give her a little reaching of warm meat. About noon, tie a creance to her leash; and going into the field, there give her a bit or two upon her lure: then unwind the creance, and draw it after you a good way; and let him who has the bird hold his right hand on the tassel of her hood, ready to unhood her as soon as you begin to lure; to which if she come well, stoop roundly upon it, and hastily seize it, let her cast two or three bits thereon. Then, unseizing and taking her off the lure, hood her and give her to the man again; and, going farther off, lure and feed her as before.

In this manner is the falconer to proceed, luring her every day farther and farther off, till she is accustomed to come freely and eagerly to the lure; after which she may be lured in company, taking care that nothing affright her. When she is used to the lure on foot, she is to be lured on horseback; which may be effected the sooner, by causing horsemen to be about her when she is lured on foot.

When she has grown familiar to this way, let somebody on foot hold the hawk, and he on horseback must call and cast the lure about his head, the holder taking off the hood by the tassel; and if she seize eagerly on the lure without fear of man or horse, then take off the creance, and lure her at a greater distance. And if you would have her love dogs as well as the lure, call dogs when you give her her living or plumage. See the article HAWKING.

FALERII (anc. geog.), a town of Etruria, on the west or right side of the Tiber; Falisci, the people of the town and territory. The territory was famous for its rich pastures; hence the *gramen Faliscum* in authors. Eutropius and Frontinus call the town *Falisci*; which, according to the last, was surnamed *Colonia Junonia*. The Falisci are called *Aequi* by Virgil; because they afforded supplemental laws to the 12 tables, (Servius). Here they made an excellent sausage, called *Venter Faliscus* (Martial).

When the Falisci were besieged by Camillus, a school-master went out of the gates of the city with his pupils, and proposed to betray them into the hands of the Roman enemy, that by such a possession he might easily oblige the place to surrender. Camillus heard the proposal with indignation, and ordered the man to be stripped naked, and whipped back to the town by those whom his perfidy wished to betray. This instance of generosity operated upon the people so powerfully that they surrendered to the Romans.

FALERNUS, *Mons Massicus* so called, (Martial); Falernus ager, a district at the foot of mount Massicus in Campania; famous for its generous wines, (Horace, Pliny). Now called *Monte Massico*.

FALISCI. See FALERII.

FALKIA, in botany: A genus of the trigynia order, belonging to the hexandria class of plants. The calyx is monophyllous; the corolla monopetalous; the seeds four in number.

Falkia
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Falkland.

FALKIRK, a town of Stirlingshire in Scotland, situated in W. Long. 3. 48. N. Lat. 56. 20. It is a large ill-built place, and is supported by great fairs for black cattle from the Highlands, it being computed that 24,000 head are annually sold there. A great deal of money is also got here by the carriage of goods landed at Carron wharf to Glasgow. This town is remarkable for a battle fought in its neighbourhood between Edward I. of England, and the Scots commanded by the Steward of Scotland, Cummin of Badenoch, and Sir William Wallace. The latter had been invested with the supreme command; but perceiving that this gave umbrage to the nobility, he resigned his power into the hands of the nobleman above mentioned, reserving to himself only the command of a small body who refused to follow another leader. The Scots generals placed their pikemen along the front, and lined the intervals between the three bodies of which their army was composed, with archers; and dreading the great superiority of the English cavalry, endeavoured to secure their front by palliades tied together with ropes. The battle was fought on the 22d of July 1298. The king of England divided his army likewise into three bodies; and by the superiority of his archers, defeated the Scots with great slaughter. Wallace alone preserved entire the troops he commanded; and retiring behind the Carron, marched leisurely along the banks of that river, which protected him from the enemy. In this battle fell John de Graham, a gentleman much celebrated for his valour, and styled the *right-hand* of the gallant Wallace. His epitaph is still to be seen on a plain stone in the church-yard of Falkirk. On the 18th of January 1746, a battle was fought here between the king's forces commanded by general Hawley, and the Highlanders headed by Charles Stuart. The former was seized with a panic, and fled; but Colonel Husk with two regiments, who kept their ground, prevented the Highlanders from pursuing their victory. Extensive ruins are perceived in the neighbourhood of this town, supposed by some antiquarians to have been the capital of the Pictish government; but others believe them to be the remains of some Roman stations.

FALKLAND, a small town of Fifeshire in Scotland, made a royal burgh by James II. in 1458. Here stood one of the seats of the Macduffs earls of Fife. On the attainder of Munro Stewart, the 17th earl, it became forfeited to the crown in 1424. James V. who grew very fond of the place, enlarged and improved it. The remains evince its former magnificence and elegance, and the fine taste of the princely architect. The gateway is placed between two fine round towers; on the right-hand joins the chapel, whose roof is of wood, handsomely gilt and painted, but in a most ruinous condition. Beneath are several apartments. The front next to the court was beautifully adorned with statues, heads in bas-relief, and elegant columns not reducible to any order, but of fine proportion, with capitals approaching the Ionic scroll. Beneath some of these pillars was inscribed I. R. M. G. 1537: or *Jacobus Rex, Maria de Guise*.—This place was also

Falkland
Fall.

a favourite residence of James VI. on account of the fine park and plenty of deer. The east side was accidentally burnt in the time of Charles II. and the park ruined during Cromwell's usurpation; when the fine oaks were cut down in order to build the fort at Perth. — This place gives title of viscount to the English family of Carey; Sir Henry Carey being so created by James VI. 1620. His son was the celebrated Lucius, who sacrificed his life in a fit of loyal despair at the battle of Newbury, and from whom Lucius Charles the present viscount is the fifth in lineal descent.

FALKLAND (Lord). See CAREY.

FALL, the descent of a heavy body towards the centre of the earth. It is also the name of a measure of length used in Scotland, containing six ells.

FALL of Man, in sacred history, that terrible event by which sin and death were introduced into the world. See ADAM, and ANTEDILUVIANS, and *Original Sin*. The account which Moses gives of this transaction is extremely brief and concise. The serpent, he informs us, being more subtle than any beast of the field, asked the woman, whether it was true that God had not granted her and her husband leave to eat of every tree in the garden? she answered, that God had allowed them to eat of all, except only the fruit of the tree in the midst of the garden; which he commanded they should not taste, nor so much as touch, lest they should die. The serpent replied, that they should not die; for God knew the virtue of the tree; and that, so soon as they eat of it, their eyes would be opened, and they would become like gods, knowing good and evil. Eve, seeing the fruit tempting to the view, took of the fruit and ate; and gave also to her husband of it, and he did eat. Immediately the eyes of both were opened; when perceiving they were naked, they sewed fig-leaves together, and made themselves aprons. Adam and Eve, hearing the voice of God walking in the garden in the cool of the day, hid themselves among the trees; but, on God's calling for Adam, he excused himself for not appearing, because he was naked. God demanded of him, who it was that told him he was naked; and whether he had disobeyed his command, in eating the forbidden fruit? Adam confessed that the woman had offered him the fruit, and he had tasted it. She, being examined likewise, acknowledged what she had done; but said, the serpent had seduced and deceived her. God then proceeded to judgment; he first cursed the serpent above all beasts, and condemned him to go on his belly, and eat the dust; adding, that he would put enmity between him and the woman, and their offspring; that the seed of the woman should bruise the serpent's head, who should bruise the other's heel. The woman was subjected to the pains of childbirth, as well as to the dominion of her husband; and as to the man, God cursed the ground for his sake, declaring, that it should bring forth thorns and thistles, and he should earn his bread by the sweat of his brow, till he returned to the dust, from whence he was taken. At last, having clothed them both with skins, he turned them out of the garden, lest they should take of the tree of life, and eat, and live for ever: then, to prevent any attempt to return to their former habitation, he placed cherubims at the east of the garden, and a flaming sword,

which turned every way, to guard the passage to the tree of life.

This concise account being, at first view, incumbered with some difficulties, several learned and pious men have been inclined to believe the whole ought to be taken in an allegorical sense, and not according to the strictness of the letter: they allege, that the ancients, and particularly the eastern nations, had two different ways of delivering their divinity and philosophy, one popular, and the other mysterious; that the scripture uses both occasionally; sometimes accommodating itself to the capacities of the people, and at other times to the real but more veiled truth; and that, to obviate the many difficulties which occur in the literal history of this sad catastrophe, the safest way is to understand it as a parabolical story, under which the real circumstances are disguised and concealed, as a mystery not fit to be more explicitly declared.

Though it cannot be denied that some of the ancient philosophers affected such an allegorical way of writing, to conceal their notions from the vulgar, and keep their learning within the bounds of their own school; yet it is apparent Moses had no such design; and as he pretends only to relate matters of fact, just as they happened, without art or disguise, it cannot be supposed but that this history of the fall is to be taken in a literal sense, as well as the rest of his writings. It is generally agreed, that the serpent which tempted Eve was the Devil, who envying the privileges of man in innocence, tempted him, and was the cause of his forfeiting all those advantages which he had received from God at his creation; and that to this end he assumed the form of a serpent. These interpretations are supported by many passages of Scripture, where the Devil is called the *serpent*, and the *old serpent*, (See John viii. 44. 2 Cor. xi. 3. and Rev. xii. 9.) Some believe that the serpent had then the use of speech, and conversed familiarly with the woman, without her conceiving any distrust of him; and that God, to punish the malice with which he had abused Eve, deprived him of the use of speech. Others maintain, that a real serpent having eaten of the forbidden fruit, Eve from thence concluded, that she too might eat of it without danger; that in effect she did eat of it, and incurred the displeasure of God by her disobedience. This, say these last authors, is the plain matter of fact which Moses would relate under the allegorical representation of the serpent conversing with Eve.

The opinion of such as believe this was not a real serpent, but only the Devil under that name, is no less liable to exception than any of the rest. For though the Devil is frequently styled in Scripture the *serpent*, and the *old serpent*, yet why he should be called the *most subtle beast of the field*; we cannot conceive; neither will the punishment inflicted on the serpent suffer us to doubt, but that a serpent's body at least was employed in the transaction.

The nature of the forbidden fruit is another circumstance in this relation that has occasioned no less variety of conjectures. The Rabbins believe it was the vine; others that it was wheat; and others, from the circumstance of Adam and Eve's covering themselves with fig-leaves immediately after their transgression, tell us, that this fruit must have been the fig; some

think

Fallacy
||
Fallopian.

think it was the cherry; and the generality of the Latius will have it to be the apple.

Those who admire allegorical interpretations, will have the forbidden fruit to have been no other than the sensual act of generation, for which the punishment inflicted on the woman was the pain of child-bearing. But this opinion has not the least foundation in the words of Moses, especially if we consider that Adam knew not his wife till after their expulsion out of Paradise.

Many have been the suppositions and conjectures upon this subject in general; and some have so far indulged their fancy in the circumstances of the fall, that they have perverted the whole narration of Moses into a fable full of the most shameful extravagancies.

FALLACY, a deception, fraud, or false appearance.

The Epicureans deny that there is any such thing as a fallacy of the senses: for, according to them, all our sensations and perceptions, both of sense and phantasy, are true; whence they make sense the primary criterion of truth.

The Cartesians, on the other hand, maintain, that we should suspect as false, or at most as dubious, every thing that presents itself to us by means only of the external senses, because they frequently deceive us. They add, that our senses, as being fallacious, were never given us by nature for the discovery of truth, or the contemplation of the principles of things; but only for pointing out to us what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle course. They say, that if a sensible object be taken in its common or general view, the sense cannot be deceived about it; but that if the object be taken under its specific view, the sense may be mistaken about it, from the want of the dispositions necessary to a just sensation, as a disorder in the organ, or any thing uncommon in the medium: thus, in some disorders of the eye, all objects appear yellow; a stick in water appears broken or crooked, &c.

FALLING-SICKNESS, or EPILEPSY. See MEDICINE-Index.

FALLING-STARS. See STAR.

FALLOPIAN TUBES, in anatomy, two ducts arising from the womb, one on each side of the fundus, and thence extended to the ovaries, having a considerable share in conception. They are called *tubæ*, from their form, which bears some resemblance to a trumpet; and their denomination, *Fallopianæ*, they take from Gabriel Fallopius, mentioned in the next article. See ANATOMY, p. 740. col. 2.

FALLOPIUS (Gabriel), a most celebrated physician and anatomist, was born at Modena in Italy, in the year 1523, and descended of a noble family. He made several discoveries in anatomy, one of which was that of the tubes, called from him the *Fallopian tubes*. He travelled through the greatest part of Europe, and obtained the character of being one of the ablest physicians of his age. He was made professor of anatomy at Pisa in the year 1548, and at Padua in the year 1551: here he died in 1562, aged 39. His writings, which are numerous, were first printed separately, and afterwards collected under the title of "*Opera genuina omnia, tam practica quam theoretica, in tres to-*

mos distributa." They were printed at Venice in 1585, and in 1606; at Francfort in 1600, *cum operum appendice*; and in 1606, in folio.

FALLOW, a pale red-colour, like that of brick half-burnt; such is that of a fallow-deer.

FALLOW-Field, or FALLOW-ground; land laid up, or that has been untilled for a considerable time.

FALLOWING of LAND, a particular method of improving land. See AGRICULTURE, n° 14, 15, 185.

FALMOUTH, a port-town of Cornwall in England, situated in W. Long. 5. 30. N. Lat. 50. 15. on a fine bay of the English channel. It is the richest and most trading town of the county, and larger than any three of its boroughs that send members to parliament. It is so commodious a harbour, that ships of the greatest burden come up to its quay. It is guarded by the castle of St Mawes and Pendennis, on a high rock at the entrance; and there is such shelter in the many creeks belonging to it, that the whole royal navy may ride safe here in any wind, it being next to Plymouth and Milford-Haven, the best road for shipping in Great Britain. It is well-built; and its trade is considerably increased since the establishment of the packet-boats here for Spain, Portugal, and the West Indies, which not only bring vast quantities of gold in specie and in bars, on account of the merchants in London; but the Falmouth merchants trade with the Portuguese in ships of their own, and they have a great share also in the gainful pilchard trade. The custom-house for most of the Cornish towns, as well as the head collector, is settled here, where the duties, including those of the other ports, are very considerable. It is a corporation, governed by a mayor and aldermen. Here is a market on Thursday, and fairs July 27. and October 30.

FALSE, in general, something contrary to truth, or not what it ought to be: thus we say a false action, false weights, false claim, &c.

FALSE Action, if brought against one whereby he is cast into prison, and dies pending the suit, the law gives no remedy in this case, because the truth or falsehood of the matter cannot appear before it is tried: and if the plaintiff is barred, or non-suited at common law, regularly all the punishment is amercement.

FALSE Imprisonment, is a trespass committed against a person, by arresting and imprisoning him without just cause, contrary to law; or where a man is unlawfully detained without legal process: and it is also used for a writ which is brought for this trespass. If a person be any way unlawfully detained, it is false imprisonment; and considerable damages are recoverable in those actions.

FALSE News; spreading of, in order to make discord between the king and nobility, or concerning any great man of the realm, is punishable by common law with fine and imprisonment; which is confirmed by statutes Westm. 1. 3 Edw. I. cap. 34. 2 Ric. II. stat. 1. cap. 5. & 12 Ric. II. cap. 11.

FALSE Oath. See PERJURY.

FALSE Prophecy. See PROPHECY.

FALSE Quarter, in farrery. See QUARTERS.

FALSE Bay, a bay lying to the eastward of the Cape of Good Hope; frequented by vessels during the prevalence of the north-westerly winds, which begin to exert their influence in May, and render it dangerous to remain in Table Bay. It is terminated to the east-

Fallow
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False.

ward by False Cape, and to the westward by the Cape of Good Hope. It is 18 miles wide at its entrance, and the two capes bear due east and west from each other.

FALSI CRIMEN, in the civil law, is fraudulent subornation or concealment, with design to darken or hide the truth, and make things appear otherwise than they are. The *crimen falsi* is committed, 1. By words, as when a witness swears falsely. 2. By writing, as when a man antedates a contract, or the like. 3. By deed, as when he sells by false weights and measures.

FALSIFY, in law, is used for proving any thing to be false. Hence we find

FALSIFYING a record, for showing it to be erroneous. Thus lawyers teach, that a person purchasing land of another, who is afterwards outlawed of felony, &c. may falsify the record, not only as to the time wherein the felony is supposed to have been committed, but also as to the point of the offence. But where a man is found guilty by verdict, a purchaser cannot falsify as to the offence; though he may for the time where the party is found guilty generally in the indictment, because the time is not material upon evidence.

EALSTAFF. See **FASTOLFF**.

FALX, in anatomy, a part of the dura mater, descending between the two hemispheres of the brain, and separating the fore-part from the hinder. It is called *falx*. i. e. "sickle," because of its curvature, occasioned by the convexity of the brain. It divides the brain as low as the corpus callosum.

FAMA CLAMOSA, in the judicial procedure of the church of Scotland, a ground of action before a presbytery against one of its members, independent of any regular complaint by a particular accuser. See **PRESBYTERY**.

Any person who is of a good character, may give to the presbytery a complaint against one of their members; but the presbytery is not to proceed to the citation of the person accused, until the accuser under his hand gives in the complaint, with some account of its probability, and undertakes to make out the libel, under the pain of being considered as a slanderer. When such an accusation is brought before them, they are obliged candidly to examine the affair. But, besides this, the presbytery considers itself obliged to proceed against any of its members, if a fama clamosa of the scandal is so great that they cannot be vindicated unless they begin the process. This they can do without any particular accuser, after they have inquired into the rise, occasion, and authors, of this report. It is a maxim in the kirk of Scotland, that religion must suffer if the scandalous or immoral actions of a minister are not corrected. And wherever a minister is reputed guilty of any immorality (although before the most popular preacher in the kingdom), none almost will attend upon his ministry. Therefore the presbytery, for the sake of religion, is obliged to proceed against a minister in case of a fama clamosa. This, however, is generally done with great tenderness. After they have considered the report raised against him, then they order him to be cited, draw out a full copy of what is reported, with a list of the witnesses names to be led for proving this allegation. He is now to be formally summoned to appear before them; and he

has warning given him, at least 10 days before the time of his compareance, to give in his answers to what is termed the *libel*; and the names of the witnesses ought also to be sent him. If at the time appointed the minister appear, the libel is to be read to him, and his answers are also to be read. If the libel be found relevant, then the presbytery is to endeavour to bring him to a confession. If the matter confessed be of a scandalous nature, such as uncleanness, the presbytery generally depose him from his office, and appoint him in due time to appear before the congregation where the scandal was given, and to make public confession of his crime and repentance. If a minister absent himself by leaving the place, and be contumacious, without making any relevant excuse, a new citation is given him, and intimation is made at his own church when the congregation is met, that he is to be holden as confessed, since he refused to appear before them; and accordingly he is deposed from his office.

FAME, a heathen goddess, celebrated chiefly by the poets. She is feigned to have been the last of the race of Titans produced by the earth, to have her palace in the air, and to have a vast number of eyes, ears, and tongues. She is mentioned by Hesiod, and particularly described by Ovid and Virgil.

FAMES CANINA, the same with **BULIMY**.

FAMIA, or **AFAMIA**, the modern name of one of the ancient Apameas. See **APAMEA**.

FAMILIARS of the **INQUISITION**, persons who assist in apprehending such as are accused, and carrying them to prison. They are assistants to the inquisitor, and called *familiars*, because they belong to his family. In some provinces of Italy they are called *cross-bearers*, and in others the *scholars of St Peter the martyr*; and they wore a cross before them on the outside garment. They are properly bailiffs of the inquisition; and the vile office is esteemed so honourable, that noblemen in the kingdom of Portugal have been ambitious of belonging to it. Nor is this surprising, when it is considered that Innocent III. granted very large indulgences and privileges to these familiars; and that the same plenary indulgence is granted by the pope to every single exercise of this office, as was granted by the Lateran council to those who succoured the Holy Land. When several persons are to be taken up at the same time, these familiars are commanded to order matters, that they may know nothing of one another's being apprehended; and it is related, that a father and his three sons, and three daughters, who lived together in the same house, were carried prisoners to the inquisition without knowing any thing of one another's being there till seven years afterwards, when they that were alive were released by an act of faith.

FAMILY, denotes the persons that live together in one house, under the direction of one head or chief manager. It also signifies the kindred or lineage of a person; and is used by old writers for a hide or portion of land sufficient to maintain one family. See **HIDE**.

FAMILY, in natural history, a term used by authors to express any order of animals, or other natural productions of the same class. See **CLASS** and **ORDER**.

Famine,
Fan.

FAMINE, dearth, or scarcity of food. For preservatives against hunger in times of famine, see the article **HUNGER**.

FAN, a machine used to raise wind, and cool the air by agitating it.

That the use of the fan was known to the ancients is very evident from what Terence says,

Cape hoc flabellum, et ventulum huic sic facito;

and from Ovid, *Art. Amand. i. 161.*

Profuit et tenues ventos movisse flabello.

The fans of the ancients were made of different materials; but the most elegant were composed of peacocks feathers, or perhaps painted, so as to represent a peacock's tail.

The custom which now prevails among the ladies of wearing fans, was borrowed from the east, where the hot climate renders the use of fans and umbrellas almost indispensable.

In the east they chiefly use large fans made of feathers, to keep off the sun and the flies. In Italy and Spain they have a large sort of square fans, suspended in the middle of their apartments, and particularly over the tables: these, by a motion at first given them, and which they retain a long time on account of their perpendicular suspension, help to cool the air and drive off flies.

In the Greek church, a fan is put into the hands of the deacons in the ceremony of their ordination, in allusion to a part of the deacon's office in that church, which is to keep the flies off the priests during the celebration of the sacrament.

What is called a *fan* amongst us and throughout the chief parts of Europe, is a thin skin, or piece of paper, taffety, or other light stuff, cut semicircularly, and mounted on several little sticks of wood, ivory, tortoise-shell, or the like. If the paper be single, the sticks of the mounting are pasted on the least ornamental side: if double, the sticks are placed betwixt them. Before they proceed to place the sticks, which they call *mounting the fan*, the paper is to be plaited in such manner, as that the plaits may be alternately inward and outward.

It is in the middle of each plait, which is usually about half an inch broad, that the sticks are to be pasted; and these again are to be all joined and rivetted together at the other end; they are very thin, and scarce exceed one-third of an inch in breadth; and where they are pasted to the paper, are still narrower, continuing thus to the extremity of the paper. The two outer ones are bigger and stronger than the others. The number of sticks rarely exceeds 22. The sticks are usually provided by the cabinet-makers or toy-men; the fan-painters plait the papers, paint, and mount them.

The common painting is either in colours or gold-leaf, applied on a silvered ground, both prepared by the gold-beaters. Sometimes they paint on a gold ground, but it is rarely; true gold being too dear, and false too paltry. To apply the silver leaves on the paper, they use a composition, which they pretend is a great secret, but which appears to be no other than gum Arabic, sugar-candy, and a little honey melted in common water, and mixed with a little brandy. This composition is laid on with a sponge; then lay-

Nº 123.

ing the silver leaves thereon, and pressing them gently down with a linen ball stuffed with cotton, they catch hold, and adhere together. When, instead of silver, gold ground is laid, the same method is observed. The ground being well dried, a number of the papers are well beaten together on a block, and by this means the silver or gold get a lustre as if they had been burnished.

FAN is also an instrument to winnow corn.—The machine used for this purpose by the ancients seems to have been of a form similar to ours. The fan, which Virgil calls *mystica vannus Iacchi*, was used at initiations into the mysteries of the ancients: For as the persons who were initiated into any of the mysteries, were to be particularly good, this instrument, which separates the wheat from the chaff, was the fittest emblem that could be of setting apart the good and virtuous from the vicious and useless part of mankind. It is figuratively applied in a similar manner in Luke iii. 17.

FANATICS, wild, enthusiastic, visionary persons, who pretend to revelation and inspiration.

The ancients called those *fanatici* who passed their time in temples (*fana*), and being often seized with a kind of enthusiasm, as if inspired by the divinity, showed wild and antic gestures. Prudentius represents them as cutting and flashing their arms with knives. Shaking the head was also common among the fanatici; for Lampridius informs us, that the emperor Heliogabalus was arrived to that pitch of madness, as to shake his head with the gashed fanatics. Hence the word was applied among us to the Anabaptists, Quakers, &c. at their first rise, and is now an epithet given to the modern prophets, muggletonians, &c.

FANCY, or imagination. See **IMAGINATION**.

FANIONS, in the military art, small flags carried along with the baggage.

FANSHAW (Sir Richard), famous for his embassies and writings, was the tenth and youngest son of Sir Henry Fanshaw of Ware Park in Hertfordshire, where it is supposed he was born about the year 1607. He distinguished himself so early by his abilities, that in 1635 he was taken into government-employments by King Charles I. and sent resident to the court of Spain; whence being recalled in the beginning of the troubles in 1641, he adhered to the royal interest, and was employed in several important matters of state. During his vacant hours he wrote divers poems, and made several translations. At the restoration it was expected he would have been made one of the secretaries of state: however, he was made master of the requests; a station in those times of considerable profit. Afterwards, on account of his skill in the Latin language, he was made secretary for that tongue. In 1661, he was sent envoy to the king of Portugal. In 1662, he was again sent to that court with the title of *ambassador*, and negotiated the marriage of his master king Charles II. with the infanta Donna Catherine. Upon his return he was made one of the privy-council. In 1664, he was sent ambassador to both the courts of Spain and Portugal; at which time the foundation of peace betwixt those crowns and England was laid by him. His conduct during his former employments in those courts gained him such high esteem there, that his reception was magnificent, exceeding all that were before, which those kings declared was

Fan
||
Fanshaw.

not

Fantasia
||
Fare.

not to be a precedent to succeeding ambassadors. He died at Madrid in 1666, on the very day he had fixed for setting out on his return to England. Besides some original poems, and others translations, he published a translation of Bathista Guarini's *Pastor Fido*, and another of the *Lusiad* of Camoen's. Among his posthumous publications are, "Letters during his embassies in Spain and Portugal; with his life prefixed."

FANTASIA, in the Italian music, signifies *fancy*; and is used for a composition, wherein the composer ties himself to no particular time, but ranges according as his fancy leads, amidst various movements, different airs, &c. This is otherwise called the *capricious style*: before sonatas were used, there were many of this kind, some of which remain even now.

FANUM, among the Romans, a temple or place consecrated to some deity. The deified men and women among the heathens had likewise their *fana*; even the great philosopher Cicero erected one to his daughter Tullia.

FANUM VACUNA, (anc. geog.), a village of the Sabines, situated between Cures and Mandela; where stood the temple of Vacuna, goddess of the idle or unemployed, in an old decayed state; and hence the epithet *putre*, used by Horace. Now called *Vocone*, in the Ecclesiastical State.

FARANDMAN, a traveller, or merchant stranger, to whom, by the laws of Scotland, justice ought to be done with all expedition, that his business or journey be not hindered.

FARCE, was originally a droll, petty show, or entertainment, exhibited by charletans, and their buffoons, in the open street to gather the crowd together. — The word is French, and signifies literally, "force-meat or stuffing." It was applied on this occasion, no doubt, on account of the variety of jests, gibes, tricks, &c. wherewith the entertainment was interlarded. Some authors derive farce from the Latin *facetia*; others from the Celtic *farce*, "mockery;" others from the Latin *facere*, "to stuff."

At present it is removed from the street to the theatre; and instead of being performed by merry-andrews to amuse the rabble, is acted by comedians and becomes the entertainment of a polite audience. Poets have reformed the wildness of the primitive farces, and brought them to the taste and manner of comedy. The difference between the two on our stage is, that comedy keeps to nature and probability, and therefore is confined to certain laws prescribed by ancient critics; whereas farce disallows of all laws, or rather sets them aside on occasion. Its end is purely to make merry; and it sticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is usually low, the persons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where heightened and exaggerated to afford the more palpable ridicule.

FARCIN, or FARCY, a disease in horses, and sometimes in oxen, &c. somewhat of the nature of a scabies or mange. See FARRIERY, sect. xxiv.

FARDING-DEAL, the fourth part of an acre of land. See ACRE.

FARE, most commonly signifies the money paid for a voyage, or passage by water; but, in London, it

is what persons pay for being conveyed from one part of the town to another in a coach or chair.

FAREWELL-CAPE, the most southerly promontory of Greenland, in W. Long. 50°, and N. Lat. 60°.

FARIN, or FARM. See FARM.

FARINA, a Latin term signifying meal, or the flour of corn. See CORN.

FARINA FACUNDANS, among botanists, the supposed impregnating meal or dust on the apices or antheræ of flowers. See POLLEN.

The manner of gathering the farina of plants for microscopical observations is this: Gather the flowers in the midst of a dry sunshiny day when the dew is perfectly off, then gently shake off the farina, or lightly brush it off with a soft hair-pencil, upon a piece of white paper; then take a single talc or isinglass between the nippers, and, breathing on it, apply it instantly to the farina, and the moisture of the breath will make that light powder stick to it. If too great a quantity be found adhering to the talc, blow a little of it off; and, if there is too little, breathe upon it again, and take up more. When this is done, put the talc into the hole of a slider, and, applying it to the microscope, see whether the little grains are laid as you desire; and if they are, cover them up with another talc, and fix the ring; but be careful that the talcs do not press upon the farina in such a manner as to alter its form.

FARLEU, money paid by the tenants in the west of England, in lieu of a heriot. In some manors of Devonshire, farleu is often distinguished to be the best goods, as heriot is the best beast, payable at the death of a tenant.

FARM, FARIN, or *Ferm*, (*Firma*), in law, signifies a little country messuage or district; containing house and land, with other conveniences; hired, or taken by lease, either in writing, or parole under a certain yearly rent. See LEASE.

This in divers parts is differently termed: in the north, it is a *tack*; in Lancashire, a *fermeholt*; in Essex, a *wike*, &c.

In the corrupted Latin, *firma* signified a place inclosed or shut in: whence, in some provinces, Menage observes, they call *closerie*, or *cleisure*, what in others they call a *farm*. Add, that we find *locare adfirmam*, to signify to let to *farm*; probably on account of the sure hold the tenant here has in comparison of tenants at will.

Spelman and Skinner, however, choose to derive the word *farm* from the Saxon *fearme*, or *feorme*, that is, *viçus*, "provision;" by reason the country people and tenants anciently paid their rents in victuals and other necessaries, which were afterwards converted into the payment of a sum of money. Whence a *farm* was originally a place that furnished its landlord with provisions. And among the Normans they still distinguish between farms that pay in kind, *i. e.* provisions, and those which pay in money; calling the former simply *fermes*, and the latter *blanche ferme*, "white ferm."

Spelman shows, that the word *firma*, anciently signified not only what we now call a *farm*, but also a feast or entertainment, which the farmer gave the proprietor or landlord, for a certain number of days, and

O

at

Farewell-
Cape
||
Farm.

Farm.

at a certain rate, for the lands he held of him. Thus *ferme* in the laws of King Canute is rendered by Mr Lambard, *viduus*; and thus we read of *reddere firmam unius noctis*, and *reddebat unum diem de firma*; which denote provision for a night and day, the rents about the time of the conquest being all paid in provisions; which custom is said to have been first altered under King Henry I. We also say *to farm* duties, imposts, &c.

Culture of a FARM. See AGRICULTURE.

FARM, as connected with gardening, and susceptible of embellishment. See GARDENING.

In speculation, it might have been expected that the first essays of improvement should have been on a farm, to make it both advantageous and delightful; but the fact was otherwise: a small plot was appropriated to pleasure; the rest was reserved for profit only. And this may, perhaps, have been a principal cause of the vicious taste which long prevailed in gardens. It was imagined that a spot set apart from the rest should not be like them: the conceit introduced deviations from nature, which were afterwards carried to such an excess, that hardly any objects truly rural were left within the enclosure, and the view of those without was generally excluded. The first step, therefore, towards a reformation, was by opening the garden to the country, and that immediately led to assimilating them; but still the idea of a spot appropriated to pleasure only prevailed, and one of the latest improvements has been to blend the useful with the agreeable; even the ornamental farm was prior in time to the more rural; and we have at last returned to simplicity by force of refinement.

Of a pastoral farm

1. The ideas of pastoral poetry seem now to be the standard of that simplicity; and a place conformable to them is deemed a farm in its utmost purity. An allusion to them evidently enters into the design of the *Leasowes* (A), where they appear so lovely as to endear the memory of their author; and justify the reputation of Mr Shenstone, who inhabited, made, and celebrated the place: it is a perfect picture of his mind, simple, elegant, and amiable; and will always suggest a doubt, whether the spot inspired his verse, or whether, in the scenes which he formed, he only realized the pastoral images which abound in his songs. The whole is in the same taste, yet full of variety; and, except in two or three trifles, every part is rural and natural. It is literally a grazing farm lying round the house; and a walk, as unaffected and as unadorned as a common field-path, is conducted through the several enclosures. But for a detail of the plan and scenery, as illustrative of the present subject, the reader is referred to the particular description of the *Leasowes* published by the late Mr Doddsley. We shall only take notice of one or two circumstances independent on the general delineation.

The art with which the divisions between the fields are diversified is one of them. Even the hedges are distinguished from each other: a common quickset fence is in one place the separation; in another, it is a lofty hedge-row, thick from the top to the bottom;

in a third, it is a continued range of trees, with all their stems clear, and the light appearing in the intervals between their boughs, and the bushes beneath them; in others, these lines of trees are broken, a few groups only being left at different distances; and sometimes a wood, a grove, a coppice, or a thicket, is the apparent boundary, and by them both the shape and the style of the enclosures are varied.

The inscriptions, which abound in the place, are another striking peculiarity; they are well known and justly admired; and the elegance of the poetry, and the aptness of the quotations, atone for their length and their number. But, in general, inscriptions please no more than once: the utmost they can pretend to, except when their allusions are emblematical, is to point out the beauties, or describe the effects, of the spots they belong to; but those beauties and those effects must be very faint, which stand in need of the assistance. Inscriptions, however, to commemorate a departed friend, are evidently exempt from the censure; the monuments would be unintelligible without them; and an urn, in a lonely grove, or in the midst of a field, is a favourite embellishment at the *Leasowes*: they are indeed among the principal ornaments of the place; for the buildings are mostly mere seats, or little root-houses; a ruin of a priory is the largest, and that has no peculiar beauty to recommend it: but a multiplicity of objects are unnecessary in the farm; the country it commands is full of them; and every natural advantage of the place within itself has been discovered, applied, contrasted, and carried to the utmost perfection, in the purest taste, and with inexhaustible fancy.

Among the ideas of pastoral poetry which are here introduced, its mythology is not omitted: but the allusions are both to ancient and to modern fables, sometimes to the fairies; and sometimes to the naiads and muses. The objects also are borrowed partly from the scenes which this country exhibited some centuries ago, and partly from those of *Arcadia*: the priory, and a Gothic seat, still more particularly characterized by an inscription in obsolete language and the black letter, belong to the one; the urns, Virgil's obelisk, and a rustic temple of Pan, to the other. All these allusions and objects are indeed equally rural: but the images in an English and a classical eclogue are not the same; each species is a distinct imitative character. Either is proper; either will raise the farm it is applied to above the ordinary level; and within the compass of the same place both may be introduced; but they should be separate: when they are mixed, they counteract one another; and no representation is produced of the times and the countries they refer to. A certain district should therefore be allotted to each, that all the fields which belong to the respective characters may lie together, and the corresponding ideas be preserved for a continuance.

2. In such an assortment, the more open and polished Of an ancient farm, scenes will generally be given to the Arcadian shepherd; and those in a lower degree of cultivation, will be thought more conformable to the manners of the ancient British yeomanry. We do not conceive that the

(A) In Shropshire, between Birmingham and Stourbridge.

Farm.

the country in their time was entirely cleared, or distinctly divided; the fields were surrounded by woods, not by hedges; and if a considerable tract of improved land lay together, it still was not separated into a number of inclosures. The subjects, therefore, proper to receive this character, are those in which cultivation seems to have encroached on the wild, not to have subdued it; as the bottom of a valley in corn, while the sides are still overgrown with wood; and the outline of that wood indented by the tillage creeping more or less up the hill. But a glade of grass, thus circumstanced, does not peculiarly belong to the species: that may occur in a park or pastoral farm; in this, the pastures should rather border on a waste or a common: if large, they may be broken by straggling bushes, thickets, or coppices; and the scattered trees should be beset with brambles and briars. All these are circumstances which improve the beauty of the place; yet appear to be only remains of the wild, not intended for embellishment. Such interruptions must, however, be less frequent in the arable parts of the farm; but there the opening may be divided into several lands, distinguished, as in common fields, only by different sorts of grain. These will sufficiently break the sameness of the space; and tillage does not furnish a more pleasing scene, than such a space so broken, if the extent be moderate, and the boundary beautiful.

As much wood is essential to the character, a spot may easily be found, where turrets rising above the covert, or some arches seen within it, may have the resemblance of a castle or an abbey. The partial concealment is almost necessary to both; for to accord with the age, the buildings must seem to be entire; the ruins of them belong to later days: the disguise is, however, advantageous to them as objects; none can be imagined more picturesque, than a tower bosomed in trees, or a cluster appearing between the stems and the branches. But the superstitions of the times furnish other objects which are more within compass: hermitages were then real; solitary chapels were common; many of the springs of the country being deemed holy wells, were distinguished by little Gothic domes built over them; and every hamlet had its cross; even this, when perfect, set on a little rustic pillar; and that raised upon a base of circular steps, may in some scenes be considerable: if a situation can be found for a May-pole, whence it would not obtrude itself on every view, that also might not be improper; and an ancient church, however unwelcome it may be when it breaks into the design of a park or a garden, in such a farm as this would be a fortunate accident: nor would the old yew in the church-yard be indifferent; it would be a memorial of the times when it was useful.

Many other objects, significant of the manners of our ancestors, might perhaps, upon recollection, occur; but these are amply sufficient for a place of considerable extent; and cottages must abound in every age and every country; they may therefore be introduced in different forms and positions. Large pieces of water are also particularly proper; and all the varieties of mills are consistent with every species of farm. From the concurrence of so many agreeable circumstances in this, be the force or the effect of the character what it may, a number of pleasing scenes may be exhibited either in a walk or riding, to be contrasted to those

which in another part of the place may be formed on Arcadian ideas; or even to be substituted in their stead, if they are omitted.

3. A part may also be free from either of these imitative characters, and laid out in a common simple farm. Some of the greatest beauties of nature are to be found in the fields, and attend an ordinary state of cultivation: wood and water may there be exhibited in several forms and dispositions; we may enlarge or divide the inclosures; and give them such shapes and boundaries as we please; every one may be an agreeable spot; together, they may compose beautiful views; the arable, the pasture, and the mead, may succeed one another; and now and then a little wild may be intermixed without impropriety; every beauty, in short, which is not unusual in an inclosed country, whether it arise from neglect or improvement, is here in its place.

The buildings, also, which are frequent in such a country, are often beautiful objects; the church and the mansion are considerable; the farm-yard itself, if an advantageous situation be chosen for it; if the ricks, and the barns, and the out-houses, are ranged with any design to form them into groupes, and if they are properly blended with trees; may be made a picturesque composition. Many of them may be detached from the groupe, and dispersed about the grounds: the dove-cote, or the dairy, may be separated from the rest; they may be elegant in their forms, and placed wherever they will have the best effect. A common barn, accompanied by a clump, is sometimes pleasing at a distance; a Dutch barn is so when near; and an hay-stack is generally an agreeable circumstance in any position. Each of these may be single; and besides these, all kinds of cottages are proper. Among so many buildings, some may be converted to other purposes than their construction denotes; and, whatever be their exterior, may within be made agreeable retreats, for refreshment, indulgence, or shelter.

With such opportunities of improvement, even to decoration within itself, and with advantages of prospect into the country about it, a simple farm may undoubtedly be delightful. It will be particularly acceptable to the owner, if it be close to his park or his garden: the objects which constantly remind him of his rank, impose a kind of constraint; and he feels himself relieved, by retiring sometimes from the splendor of a seat into the simplicity of a farm: it is more than a variety of scene; it is a temporary change of situation in life, which has all the charms of novelty, ease, and tranquillity, to recommend it. A place, therefore, can hardly be deemed perfect, which is not provided with such a retreat. But if it be the whole of the place, it seems inadequate to the mansion: a visitor is disappointed; the master is dissatisfied; he is not sufficiently distinguished from his tenants; he misses the appendages incidental to his seat and his fortune; and is hurt at the similarity of his grounds with the country about them. A pastoral or an ancient farm is a little above the common level; but even these, if brought close up at the door, set the house in a field, where it always appears to be neglected and naked. Some degree of polish and ornament is expected in its immediate environs; and a garden, though it be but a small one, should be interposed between the mansion and any species of farm.

Farm.

Farm.
Of an or-
namented
farm.

4. A sense of the propriety of such improvements about a seat, joined to a taste for the more simple delights of the country, probably suggested the idea of an *ornamented farm*, as the means of bringing every rural circumstance within the verge of a garden. This idea has been partially executed very often; but no where, perhaps, so completely, and to such an extent, as at Woburn farm, (near Weybridge in Surry.) The place contains 150 acres: of which near 35 are adorned to the highest degree; of the rest, about two thirds are in pasture, and the remainder is in tillage. The decorations are, however, communicated to every part: for they are disposed along the sides of a walk, which, with its appendages, forms a broad belt round the grazing-grounds; and is continued, though on a more contracted scale, through the arable. This walk is properly garden; all within it is farm; the whole lies on the two sides of a hill, and on a flat at the foot of it: the flat is divided into corn-fields; the pastures occupy the hill; they are surrounded by the walk, and crossed by a communication carried along the brow, which is also richly dressed, and which divides them into two lawns, each completely encompassed with garden.

These are in themselves delightful; the ground in both lies beautifully; they are diversified with clumps and single trees; and the buildings in the walk seem to belong to them. On the top of the hill is a large octagon structure; and, not far from it, the ruin of a chapel. To one of the lawns the ruin appears, on the brow of a gentle ascent, backed and grouped with wood; from the other is seen the octagon, upon the edge of a steep fall, and by the side of a pretty grove, which hangs down the declivity. This lawn is further embellished by a neat Gothic building; the former by the house, and the lodge at the entrance; and in both, other objects of less consequence, little seats, alcoves, and bridges, continually occur.

The buildings are not, however, the only ornaments of the walk; it is shut out from the country, for a considerable length of the way, by a thick and lofty hedge-row, which is enriched with woodbine, jessamine, and every odoriferous plant whose tendrils will entwine with the thicket. A path, generally of sand or gravel, is conducted in a waving line, sometimes close under the hedge, sometimes at a little distance from it; and the turf on either hand is diversified with little groupes of shrubs, of firs, or the smallest trees, and often with beds of flowers: these are rather too profusely strewed, and hurt the eye by their littlenesses; but then they replenish the air with their perfumes, and every gale is full of fragrantcy. In some parts, however, the decoration is more chaste; and the walk is carried between larger clumps of evergreens, thickets of deciduous shrubs, or still more considerably open plantations. In one place it is entirely simple, without any appendages, any gravel, or any sunk fence to separate it from the lawn; and is distinguished only by the richness of its verdure, and the nicety of its preservation. In the arable part it is also of green sward, following the direction of the hedges about the several inclosures: these hedges are sometimes thickened with flowering shrubs; and in every corner or vacant space, is a rosary, a close or an open clump, or a

bed of flowers: but if the parterre has been rifled for the embellishment of the fields, the country has on the other hand been searched for plants new in a garden; and the shrubs and the flowers which used to be deemed peculiar to the one, have been liberally transferred to the other; while their number seems multiplied by their arrangement in so many and such different dispositions. A more moderate use of them would, however, have been better; and the variety more pleasing, had it been less licentious.

But the excess is only in the borders of the walk; the scenery through which it leads are truly elegant, every where rich, and always agreeable. A peculiar cheerfulness overspreads both the lawns, arising from the number and the splendor of the objects with which they abound, the lightness of the buildings, the inequalities of the ground, and the varieties of the plantations. The clumps and the groves, though separately small, are often massed by the perspective, and gathered into considerable groups, which are beautiful in their forms, their tints, and their positions. The brow of the hill commands two lovely prospects: the one gay and extensive, over a fertile plain, watered by the Thames, and broken by St Anne's Hill and Windsor Castle; a large mead, of the most luxuriant verdure, lies just below the eye, spreading to the banks of the river; and beyond it the country is full of farms, villas, and villages, and every mark of opulence and cultivation. The other view is more wooded: the steeple of a church, or the turrets of a seat, sometimes rise above the trees; and the bold arch of Walton Bridge is there a conspicuous object, equally singular and noble. The inclosures on the flat are more retired and quiet; each is confined within itself; and all together they form an agreeable contrast to the open exposure above them.

With the beauties which enliven a garden are every where intermixed many properties of a farm: both the lawns are pastured; and the lowings of the herds, the bleating of the sheep, and the tinklings of the bell-wedder, resound through all the plantations: even the clucking of poultry is not omitted; for a menagerie of a very simple design is placed near the Gothic building; a small serpentine river is provided for the water-fowl; while the others stray among the flowering shrubs on the banks, or straggle about the neighbouring lawn: and the corn-fields are the subjects of every rural employment which arable land from seed-time to harvest can furnish. But though so many of the circumstances occur, the simplicity of a farm is wanting; that idea is lost in such a profusion of ornament; a rusticity of character cannot be preserved amidst all the elegant decorations which may be lavished on a garden.

FARMER, he that tenants a farm, or is lessee thereof. Also generally every lessee for life, years, or at will, is called *farmer*. As this word implies no mystery, except it be that of husbandry, husbandman is the proper addition for a farmer.

FARMER, in mining, is the lord of the field, or one that farms the lot and cope of the king.

FARN ISLANDS, two groups of little islands and rocks, 17 in number, lying opposite to Bamborough castle in Northumberland. At low water the points of several others are visible besides the 17 just mention-

Farm
||
Farn.

Farn
||
Farnham.

ed. The nearest island to the shore is called the *Houfe-
island*, and lies exactly one mile and 68 chains from the
coast. The most distant is about seven or eight miles.
Their produce is kelp, feathers, and a few seals, which
the tenant watches and shoots for the sake of the oil
and skins. Some of them yield a little grafs that may
serve to feed a cow or two; which the people trans-
port over in their little boats. The largest or *Houfe*
island is about one mile in compass, and has a fort and
a lighthouse. It contains about six or seven acres of
rich pasture; and the shore abounds with good coals
which are dug at the ebb of tide. St Cuthbert is said
to have passed the two last years of his life on this
island. A priory of Benedictines was afterwards estab-
lished here, for six or eight monks, subordinate to
Durham. A square tower, the remains of a church,
and some other buildings, are still to be seen on this
island; and a stone coffin, which is pretended to be
that of St Cuthbert. At the north end of the isle is
a deep chasm, from the top to the bottom of the
rock, communicating with the sea; through which,
in tempestuous weather, the water is forced with
great violence and noise, and forms a fine jet d'eau of
60 feet high. It is called by the inhabitants of the
opposite coast, the *Churn*. One of the islands in the
most distant groupe is called the *Pinnacles*, from
some vast columnar rocks at the south end, even at
their sides, flat at the tops, and entirely covered with
guillemots and shags. The fowls pass from one to
the other of these columns by means of a board, which
they place from top to top, forming a narrow bridge
over such a dreadful gap that the very sight of it strikes
one with horror.

FARNABIE (Thomas), son of a carpenter at
London, born in 1575, staid a short while at Oxford;
where being enticed to abandon his religion, he went
to Spain, and was there educated in a college belong-
ing to the Jesuits. Being weary of their severe disci-
pline, he went with Sir John Hawkins and Sir Francis
Drake in their last voyage in 1595. He was after-
wards a soldier in the Low Countries: but being re-
duced to great want, returned to England, where wan-
dering about for some time under the name of *Thomas*
Bainrafe, the anagram of his name, he settled at Mat-
tock in Somersetshire, and taught a grammar-school
with good reputation. He removed to London, and
opened a school with large accommodations for young
gentlemen. While he taught this school, he was made
master of arts at Cambridge, and incorporated into the
university of Oxford. Thence he removed, in 1638,
to Seven-oaks in Kent; and taught the sons of several
noblemen and gentlemen, who boarded with him, with
great success, and grew rich. His works gained him
reputation. Upon the breaking out of the civil com-
motions in 1641, he was cast into prison. It was de-
bated in the house of commons, whether he should be
sent to America; but this motion being rejected, he
was removed to Ely-house in Holborn, and there he
died in 1647. Mr Farnabie was a very eminent gram-
marian; and many writers have spoken with great ap-
probation of his labours. M. Bayle in particular says;
"His notes upon most of the ancient Latin poets have
been of very great use to young beginners; being short,
learned, and designed chiefly to clear up the text."

FARNHAM, or FERNHAM; a town of Surry, and

Farnham
||
Farquhar.

capital of the hamlet of its own name, 41 miles from
London on the Winchester road. It is a large popu-
lous place, situated on the river Wey, and supposed to
have its name from the fern which abounded here. It
was given by the West Saxon king Ethelbald to the
see of Winchester; the bishops of which have general-
ly resided in the castle here, in the summer time, ever
since the reign of king Stephen, whose brother, its then
bishop, first built it. It was a magnificent structure,
with deep moats, strong walls and towers at proper
distances, and a fine park; but it is much decayed.
The town, which has many handsome houses, and well
paved streets, is governed by 12 masters or burgesses,
of whom two are bailiffs, (chosen annually). They
have the profit of the fairs and markets, and the assize
of bread and beer; and hold a court every three weeks,
which has power of trying and determining all actions
under 40s. From Michaelmas to Christmas here is a
good market for oats; and one of the greatest wheat
markets in England, especially between All-Saints day
and midsummer. The toll-dish here was once reckon-
ed worth 200l. a-year; but it is much diminished,
since the people about Chichester and Southampton be-
gan to send their meal to London by sea. But this loss
is amply made up by the vast growth of hops here, of
which there are 300 or 400 acres of plantations about
this town, and they are said to outdo the Kentish hop-
yards both in quantity and quality. This town sent
members to parliament in the reign of Edward II.
but never since. The magistrates have their privileges
from the bishop of Winchester, to whom they pay an
acknowledgment of 12d. a-year. The market is on
Thursday: fairs, Holy Thursday, June 24. and Novem-
ber 2. Here are a free school, and a great market for
Welsh hofe.

FARNOVIANS, in ecclesiastical history, a sect of
Socinians, so called from Stanislaus Farnovius, who se-
parated from the other Unitarians in the year 1568,
and was followed by several persons eminent for their
learning. This sect did not last long; for having
lost their chief, who died in 1615, it was scattered
abroad and reduced to nothing. Farnovius was enga-
ged by Gonesius to prefer the Arian system to that of
the Socinians, and consequently asserted, that Christ
had been produced out of nothing by the Supreme Be-
ing before the creation of this terrestrial globe. His
sentiments concerning the Holy Ghost are not certain-
ly known; however, it appears that he warned his dis-
ciples against paying the tribute of religious worship to
the Divine Spirit.

FARQUHAR (George); an ingenious poet and
dramatic writer, the son of a clergyman in Ireland,
was born at Londonderry in 1678. He was sent to
Trinity College, Dublin; but his volatile disposition not
relishing a college life, he betook himself to the stage;
where, having dangerously wounded a brother-actor in
a tragic scene, by forgetting to change his sword for
a foil, it shocked him so much that he left the Dublin
theatre and went to London. Here he procured a lieu-
tenant's commission by the interest of the earl of Or-
very; which he held several years, and gave many
proofs both of courage and conduct. In 1698, he wrote
his first comedy called *Love and a Bottle*; which, for
its sprightly dialogue and busy scenes, was well recei-
ved. In the beginning of the year 1700, which was the

Farquhar the jubilee year at Rome, he brought out his *Constant Couple*, or a *Trip to the Jubilee*; and suited Mr Wilks's talents so well in the character of Sir Harry Wildair, that the player gained almost as much reputation as the poet. This tempted him to continue it in another comedy called *Sir Harry Wildair*, or *The sequel of the Trip to the Jubilee*; in which Mrs Oldfield acquired great applause. In 1702, he published his *Miscellanies*, which contain a variety of humorous fallies of fancy. In 1703, appeared the *Inconstant*, or *the Way to win him*; in 1704, a farce called the *Stage-coach*; in 1705, *The Twin Rivals*; and in 1706, the *Recruiting Officer*, founded on his own observations while on a recruiting party at Shrewsbury. His last comedy was the *Beaux-Stratagem*, of which he did not live to enjoy the full success. Mr Farquhar married in 1703. Before that time his manner of life had been rather dissipated. The lady, therefore, who afterwards became his wife, having fallen violently in love with him, but judging that a gentleman of his humour would not easily be drawn into the trammels of matrimony, contrived to have it given out that she was possessed of a large fortune; and finding means afterwards to let Mr Farquhar know her attachment to him, interest and vanity got the better of his passion for liberty, and the lady and he were united in the hymeneal bands. But how great was his disappointment, when he found all his prospects overclouded so early in life (for he was then no more than 24), by a marriage from which he had nothing to expect but an annual increase of family, and an enlargement of expence in consequence of it far beyond what his income would support. Yet, to his honour be it told, though he found himself thus deceived in a most essential particular, he never was known once to upbraid his

wife with it; but generously forgave an imposition which love for him alone had urged her to, and even behaved to her with all the tenderness and delicacy of the most indulgent husband. Mrs Farquhar, however, did not very long enjoy the happiness she had purchased by this stratagem; for the circumstances that attended this union were in some respect perhaps the means of shortening the period of the captain's life. For, finding himself considerably involved in debt in consequence of their increasing family, he was induced to make application to a certain noble courtier, who had frequently professed the greatest friendship for him, and given him the strongest assurances of his intended services. This pretended patron repeated his former declarations; but, expressing much concern that he had nothing at present immediately in his power, advised him to convert his commission into money to answer his present occasions, and assured him that in a short time he would procure another for him. Farquhar, who could not bear the thoughts of his wife and family being in distress, followed this advice, and sold his commission; but, to his great mortification and disappointment, found, on a renewal of his application to this inhuman nobleman, that he had either entirely forgotten, or had never intended to perform, the promise he had made him. This distracting frustration of all his hopes fixed itself so strongly on our author's mind, that it soon brought on him a cure, tho' not a very sudden, declension of nature, which at length carried him off the stage of life in 1707, before he arrived at 30 years of age.—His comedies are so diverting, and the characters so natural, that his plays still continue to be represented to full houses.

FARRIER, one whose employment is to shoe horses, and cure them when diseased or lame.

F A R R I E R Y,

THE art of preventing, curing, or palliating, the diseases of horses.

The practice of this useful art has been hitherto almost entirely confined to a set of men who are totally ignorant of anatomy and the general principles of medicine. It is not therefore surprising, that their prescriptions should be equally absurd as the reasons they give for administering them. It cannot indeed be expected that farriers, who are almost universally illiterate men, should make any real progress in their profession. They prescribe draughts, they rowel, cauterise, &c. without being able to give any other reason for their practice, but because their fathers did so before them. How can such men deduce the cause of a disease from its symptoms, or form a rational method of cure, when they are equally ignorant of the causes of diseases and the operation of medicines?

The miserable state of this useful art has determined us to select, from the best authors, such a system of practice as seems to be formed on rational principles; this, we hope, will be a sufficient apology for being so full upon this article.

SECT. I. General Directions with regard to the Management of Horses.

1. It ought to be laid down as a general rule, to

give horses as few medicines as possible; and by no means to comply with the ridiculous custom of some, who are frequently bleeding, purging, and giving balls, though their horses be in perfect health, and have no indication that requires such treatment.

2. Proper management in their feeding, exercise, and dressing, will alone cure many disorders, and prevent most; for the simplicity of a horse's diet, which chiefly consists of grain and herbage, when good in kind, and dispensed with judgment, secures him from these complicated disorders which are the general effects of intemperance in the human body.

3. In France, Germany, and Denmark, horses are seldom purged; there they depend much on alteratives; the use of the liver of antimony we have from the French, which is in general a good medicine for that purpose, and may, in many cases, be substituted in the room of purging.

4. As hay is so material an article in a horse's diet, great care should be taken to procure the best: when it is not extraordinary, the dust should be well shook out before it is put in the rack; for such hay is very apt to breed vermin.

5. Beans afford the strongest nourishment of all grain; but are fittest for laborious horses, except on particular occasions. In some seasons they breed a kind of vermin called the *red bugs*, which is thought to be dangerous;

gerous; the best method in such a case is to procure them well dried and split.

6. Bran scalded is a kind of panada to a sick horse: but nothing is worse than a too frequent use of it, either dry or scalded; for it relaxes and weakens the bowels too much. The botts in young horses may be owing to too much musty bran and chaff, given with other foul food to make them up for sale; particular care therefore should be taken that the bran be always sweet and new.

7. Oats, well ripened, make a more hearty and durable diet than barley, and are much better suited to the constitutions of British horses. A proper quantity of cut straw and hay mixed with them, is sometimes very useful to horses troubled with botts, indigestion, &c.

8. Horses who eat their litter, should particularly have cut straw and powdered chalk given them with their feed; as it is a sign of a depraved stomach, which wants correcting.

9. The salt-marshes are good pasture for horses who have been surfeited, and indeed for many other disorders: they purge more by dung and urine than any other pasture, and make afterwards a firmer flesh; their water is for the most part brackish, and of course, as well as the grass, saturated with salts from the seawater.

10. A summer's grass is often necessary; more particularly to horses glutted with food, and which use little exercise; but a month or two's running is proper for most; those especially who have been worked hard, and have stiff limbs, swelled legs, or wind-galls. Horses whose feet have been impaired by quitters, bad shoeing, or any other accidents, are also best repaired at grass. Those lamenesses particularly require turning out to grass, where the muscles or tendons are contracted or shrunk; for by the continual gentle exercise in the field, with the assistance of a patten-shoe on the opposite foot, the shortened limb is kept on the stretch, the wasted parts are restored to their ordinary dimensions, and the limb again recovers its usual tone and strength.

11. The fields which lie near great towns and are much dunged, are not proper pasture for horses; but on observation appear very injurious to them, if they feed thereon all the summer.

12. Horses may be kept abroad all the year, where they have a proper stable or shed to shelter them from the weather, and hay at all times to come to. So treated, they are seldom sick; their limbs are always clean and dry; and, with the allowance of corn, will hunt, and do more business than horses kept constantly within doors.

13. If horses, when taken from grass, should grow hot and costive, mix bran and chopt hay with their corn; and give them sometimes a feed of scalded bran for a fortnight, or longer: let their exercise and diet be moderate for some time, and increase both by degrees.

14. When horses are foiled in the stable, care should be taken that the herbage is young, tender, and full of sap; whether it be green barley, tares, clover, or any thing else the season produces; and that it be cut fresh once every day at least, if not oftener.

15. When horses lose their flesh much in foiling, they should in time be taken to a more solid diet: for it is

not in foiling as in grazing; where, though a horse loses his flesh at first, yet after the grass has purged him, he soon grows fat.

16. Young horses, who have not done growing, must be indulged more in their feeding than those come to their maturity; but if their exercise is so little as to make it necessary to abridge their allowance of hay, a little fresh straw should constantly be put in their racks to prevent their nibbling the manger, and turning crib-biters; they should also be sometimes strapped back in order to cure them of this habit.

17. It is obvious to every one, what care should be taken of a horse after violent exercise, that he cool not too fast, and drink no cold water, &c. for which reason we shall wave particular directions.

18. Most horses fed for sale have the interstices of their muscles so filled with fat, that their true shapes are hardly known. For which reason a horse just come out of the dealer's hands should at first be gently used. He ought to lose blood, and have his diet lowered, though not too much: walking exercise is most proper at first, two hours in the day; in a week or fortnight two hours at a time, twice a-day; after this usage for a month, bleed him again, and give him two or three times a-week scalded bran, which will prepare him for purging physic, that may now be given safely, and repeated at the usual intervals.

19. When a horse comes out of a dealer's hands, his cloathing must be abated by degrees, and care taken to put him in a moderately warm stable; otherwise the sudden transition would be attended with the worst consequences.

SECT. II. Of Blood-letting.

1. HORSES who stand much in stable, and are full-fed, require bleeding now and then; especially when their eyes look heavy, dull, red, and inflamed; as also, when they feel hotter than usual, and mangle their hay.

Young horses should be bled when they are shedding their teeth, as it takes off those feverish heats they are then subject to. But the cases that chiefly require bleeding, are colds, fevers of most kinds, falls, bruises, hurts of the eyes, strains, and all inflammatory disorders, &c.

It is right to bleed a horse when he begins to grow fleshy at grass, or at any other time when he looks heavy: and it is generally proper to bleed before purging.

Let your horse always be bled by measure, that you may know what quantity you take away: two or three quarts are always enough at one time; when you repeat it, allow for the disorder and the horse's constitution.

Although the operation of blood-letting is generally thought to be pretty well known, yet there are many untoward accidents that frequently happen from the unskilful and unexperienced in performing it. The following directions and cautions on this head are extracted from Mr Clark's *Treatise on the Prevention of Diseases incidental to Horses*.

As horses are naturally timorous and fearful, which is too frequently increased by bad usage and improper chastisement, they require in some cases, particularly in this of bleeding, to be taken unawares or by surprise,

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prise, and the orifice made into the vein before their fears are alarmed. For this reason, the fleam and blood-stick, as it is called, have been long in use, and in skilful hands are not improper instruments for the purpose; although with many practitioners the spring-fleam would be much safer, and on that account ought to be preferred. When a lancet is used, the instant the horse feels the point of it, he raises or shakes his head and neck, in order to shun the instrument before the operator has time to make a proper orifice, which frequently proves too small or too large; for this reason, those who have tried the lancet have been obliged to lay it aside.

Many persons tie a ligature or bandage round the neck, in order to raise the vein, and that they may strike the fleam into it with the greater certainty; but a slight view of its effects in preventing this, and its other consequences, will show the impropriety of the practice.

When a ligature is tied round the neck previous to bleeding in the jugular veins, it is to be observed, that it stops the circulation in both veins at the same time; hence they become turgid and very full of blood, inasmuch that they feel under the finger like a tight cord; and as the parts around them are loose and soft, when the stroke is given to the fleam, the vein by its hardness or tightness slips to one side, of course it eludes the stroke; hence a deep wound is made by the fleam to no purpose, and this is sometimes too frequently repeated. Unskilful people have likewise a custom of waving or shaking the blood-stick before they strike the fleam in view of the horse, whose eye is fixed on that instrument; and when they intend to give the stroke, they make a greater exertion: hence the horse being alarmed by its motion, raises his head and neck, and a disappointment follows. The struggle that ensues by this means prolongs the operation; the ligature at the same time being still continued round the neck, a total stagnation of the blood in the vessels of the head takes place; and hence it frequently happens, that the horse falls down in an apoplectic fit. In such cases the operator being disconcerted, generally desists from any farther attempts to draw blood at that time, under the idea that the horse was vicious and unruly, although the very treatment the horse had just undergone rendered bleeding at this time the more necessary, in order to make a speedy revulsion from the vessels of the head. Therefore, a ligature or bandage ought never to be used till such time as the opening is made into the vein; and even then it will not be necessary at all times if the horse can stand on his feet, as a moderate pressure with the finger on the vein will make the blood flow freely; but if the horse is lying on the ground, a ligature will be necessary.

But farther, the concussion or shock the horse receives from his falling down in the above situation, which will always happen if the ligature is too long continued, may cause a blood-vessel within the head to burst, and death may be the consequence.

Another custom equally absurd is allowing the blood to fall in a dunghill amongst straw, in dry sand, or in dry dust, by which means no distinct idea can be formed of the quantity that is or ought to be taken away. In such cases horses have fallen down in a faint from the loss of too much blood, before the operator thought

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of stopping up the orifice. For this and a variety of other reasons which might be mentioned, a measure, as above observed, ought always to be used, in order to ascertain the quantity of blood that is taken away.

In pinning up the orifice, some have a custom of raising or drawing out the skin too far from the vein; hence the blood flows from the orifice in the vein into the cellular substance between it and the skin, which causes a large lump or swelling to take place immediately: this frequently ends in what is called a *swelled neck*; a suppuration follows, which proves both tedious and troublesome to cure. In cases where a horse may be tied up to the rack after bleeding in the neck, pinning up the external orifice may be dispensed with; but when a horse is troubled with the gripes or any other acute disease, in which he lies down and tumbles about, it is necessary that the orifice be pinned up with care, in order to prevent the loss of too much blood.

As the neck or jugular vein on the near side is commonly opened for convenience by those who are right-handed, the young practitioner should learn to perform on both sides of the neck. This he will find in practice to be not only useful but necessary, as he may frequently have occasion to draw blood from horses in very awkward situations; he will likewise find his account in it in a variety of cases, which it is needless here to particularize.

The proper place for making the opening in the neck or jugular vein is likewise necessary to be attended to: for when the orifice is made too low, or about the middle of the neck, where the vein lies deep under the muscular teguments, the wound becomes difficult to heal, and frequently ends in a suppuration, with a jetting out of proud flesh from the orifice; which, unfortunately, is as unskilfully treated in the common method of cure, *viz.* by introducing a large piece of corrosive sublimate into the wound: this not only destroys the proud flesh in the lips of the wound, but a considerable portion of the flesh around it; and in farriery it is called *coreing out the vein*. It frequently happens, that this corrosive application destroys the vein likewise; and sometimes violent hemorrhagies follow, so as to endanger the life of the animal.

The most proper place for making the opening in the jugular veins is where the teguments are thinnest, which is about a hand-breadth from the head, and about one inch below the branching or joining of the vein which comes from the lower jaw, and which may be distinctly seen when any pressure is made on the main branch of the vein.

In performing the operation with a fleam, the operator should hold the fleam between the fore-finger and thumb of the left hand; with the second finger he is to make a slight pressure on the vein, and before it becomes too turgid or full make the opening; the same degree of pressure is to be continued on the vein, till such time as the quantity of blood to be taken away is received into a proper measure.

Another great error, which generally prevails in opening the veins with a fleam, is the applying too great force, or giving too violent a stroke to it, by which it is forced through the opposite side of the vein: hence there is danger of wounding the coats of the arteries, as they generally lie under the veins; or, in some particular places, of wounding the tendons, especially when this

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this operation is performed in the legs, thighs, &c. or in the veins, commonly called the *plate veins*, under the breast, the consequences are frequently very troublesome to remove, and in some cases prove fatal. Mr Gibbon, in his Treatise on the Diseases of Horses, mentions a case of a fine horse that was bled in the plate veins for a lameness of the shoulder, which was followed with a hard oval swelling about the size of a goose egg, which extended upwards on the breast, and likewise down the leg, attended with excessive pain, fever, deadness in the horse's looks, and all the other symptoms of a beginning mortification.

In order to avoid the consequences sometimes attending these local operations in the breast, legs, &c. and as horses are more or less troublesome and restless, whereby accidents of this kind may happen, it will perhaps be advisable, in most cases of lameness, &c. to draw blood from the larger veins in the neck only, where there is less danger of accidents, more especially if a spring steem is used: for although it might be of some advantage in particular cases to draw blood as near the affected part as possible, yet the bad consequences frequently attending it ought to counterbalance any advantages that may be expected from it, especially as the quantity of blood drawn from the small veins is but inconsiderable, and of course no great benefit can be expected from it in horses when they are diseased.

The principal view in drawing blood is the lessening of its quantity, by which the remaining mass circulates with more freedom in the vessels; it likewise takes off the inflammatory tendency of the blood, removes spasms, &c. and prevents other bad consequences that may follow, especially in plethoric habits: and it ought always to be remembered, that when the signs or symptoms of a disease are taken from the motion of the blood, the disorders arising from it depend upon its circulation being either increased or diminished: hence, therefore, all the changes which take place in the texture, quantity, and quality of the blood, are attended with a diminution or increase of its velocity.

Although the cases which may require bleeding are numerous, yet one general caution is necessary, namely, never to take away blood but when it is absolutely necessary; for it is a fluid that may be easily taken away, but cannot be so easily replaced; besides, the practice of bleeding frequently, or at stated times, is exceedingly improper, as it disposes the body to become lax, weak, and plethoric. In bleeding, therefore, a due regard must always be had to the constitution, age, strength, &c. of horses, and the state or habit of body they are in at the time.

Although we ought to be sparing of drawing blood from horses on trifling occasions when they may be said to be in health, yet when cases occur that do require it, it may not only safely, but usefully, be recommended to take away a greater quantity at once than is generally done; that is, from six to eight pounds, which will be about three or four quarts English measure, according to the urgency of the symptoms, &c. at the time, strength and age of the horse considered. For as horses are very subject to inflammatory diseases and those that are of the spasmodic kind, and as bleeding plentifully relaxes the whole system in these cases, the taking away a small quantity of blood, about one

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quart or two pounds, is in fact trifling with the disease; the horse is said to have been *blooded*, and that satisfies his owner and the farrier; time is lost; the disease acquires strength; it will then be beyond the power of art to mitigate or to conquer it: hence the horse falls a sacrifice to timidity and ignorance. It is to be remembered, that inflammatory diseases, particularly when the bowels are affected, make a very rapid progress in horses; and if they are not overcome at the beginning by bleeding plentifully, the horse commonly dies in 24 or 30 hours of a gangrene and mortification in the intestines.

Purging.

SECT. III. *Of Purging.*

PURGING is often necessary in gross full horses, in some disorders of the stomach, liver, &c. but should be directed with caution. Before a purge is given to any horse, it is necessary some preparation should be made for it, in order to render the operation more safe and efficacious: thus a horse that is full of flesh should first be bled, and at the same time have his diet lowered for a week, especially those that have been pampered for sale; several masses of scalded bran should also previously be given, in order to open the bowels, and unload them of any indurated excrement, which sometimes proves an obstacle to the working of the physic, by creating great sickness and griping.

Let it be remembered, that a horse is purged with difficulty; that the physic generally lies 24 hours in the guts before it works; and that the tract of bowels it has to pass through is above 30 yards, all lying horizontally: consequently resinous and other improper drugs may, and often do, by their violent irritation, occasion excessive gripings and cold sweats, shave-off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications and death. It is remarkable too, that the stomach and guts of a horse are but thin, compared to some other animals of the same bulk, and therefore must be more liable to inflammation and irritation.

Horses kept much in the stable, who have not the proper benefit of air and exercise in proportion to their food, should in spring have a mild purge or two after a previous preparation by bleeding, lowering their diet, and scalded masses.

Horses that fall off in their stomach, whether it proceeds from too full feeding, or ingendering crudities and indigested matter, should have a mild purge or two.

Horses of a hot temperament will not bear the common aloetic purges; their physic therefore should be mild and cooling.

Purging is always found very beneficial in stubborn dry coughs: but mild mercurials joined with them make them yet more efficacious.

Horses of a watery constitution, who are subject to swelled legs, that run a sharp briny ichor, cannot have the causes removed any way so effectually as by purging.

The first purge you give to a horse should be mild, in order to know his constitution.

It is a mistaken notion, that if a proper prepared purge does not work to expectation, the horse will be injured by it; for though it does not pass by stool, its operation may be more efficacious as an alternative to

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purify

Purging.

purify the blood, and it may pass by urine or other secretions.

Purging medicines are very successfully given in small quantities, mixed with others; and act then as alteratives.

If mercurial physic is given, care should be taken that it be well prepared; and warmer cloathing and greater circumspection are then required.

Purges should be given early in the morning upon an empty stomach: about three or four hours after the horse has taken it, he should have a feed of scalded bran; and a lock or two of hay may then be put into his rack. The same day give him two more mashes; but should he refuse warm meat, he may be allowed raw bran.

All his water should be milk-warm, and have a handful of bran squeezed in it; but if he refuses to drink white water, give it him without bran.

Early the next morning give him another mash; but if he refuses to eat it, give him as much warm water as he will drink: let him be properly cloathed, and rode gently about. This should be done two or three times a-day, unless he purges violently; once or twice will then be sufficient: at night give him a feed of oats mixed with bran.

During the working, a horse should drink plentifully; but if he will not drink warm water, he must be indulged with cold, rather than not drink at all.

We shall here insert some general forms of purges.

TAKE focotorine aloes ten drams, jalap and salt of tartar each two drams, grated ginger one dram, oil of cloves 30 drops; make them into a ball with syrup of buckthorn. Or,

TAKE aloes and cream of tartar each one ounce, jalap two drams, cloves powdered one dram, syrup of buckthorn a sufficient quantity.

Or the following, which has an established character among sportsmen:

TAKE aloes from ten drams to an ounce and an half, myrrh and ginger powdered each half an ounce, saffron and oil of aniseed each half a dram.

Mr Gibbon recommends the following:

TAKE focotorine aloes ten drams, myrrh finely powdered half an ounce, saffron and fresh jalap in powder of each a dram; make them into a stiff ball with syrup of roses, then add a small spoonful of rectified oil of amber.

The focotorine aloes should always be preferred to the Barbadoes or plantation aloes, though the latter may be given to robust strong horses; but even then should always be prepared with the salt or cream of tartar, which, by opening its parts, prevents its adhesion to the coats of the stomach and bowels; from whence horrid gripings, and even death itself, has often ensued. This caution is well worth remarking, as many a horse hath fallen a sacrifice to the neglect of it.

Half an ounce of Castile soap, to a horse of a gross constitution, may be added to any of the above; and the proportions may be increased for strong horses.

When mercurial physic is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following, when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate

horses; and if prepared with the Indian rhubarb, will not be expensive.

TAKE of the finest focotorine aloes one ounce, rhubarb powdered half an ounce or six drams, ginger grated one dram; make into a ball with syrup of roses.

The following purging drink may be given with the utmost safety; it may be quickened or made stronger, by adding an ounce more senna, or two drams of jalap.

TAKE senna two ounces; infuse it in a pint of boiling water two hours, with three drams of salt of tartar; pour off, and dissolve in it four ounces of Glauber's salts, and two or three of cream of tartar.

This last physic is cooling, easy, and quick in its operation; and greatly preferable in all inflammatory cases to any other purge, as it passes into the blood, and operates also by urine.

When horses lose their appetite after purging, it is necessary to give them a warm stomach-drink made of an infusion of camomile-flowers, aniseeds, and saffron: or the cordial ball may be given for that purpose.

Should the purging continue too long, give an ounce of diascordium in an English pint of Port-wine; and repeat it once in 12 hours, if the purging continues. Plenty of gum-arabic water should also be given; and in case of violent gripes, fat broth glysters or tripe liquor should be often thrown up, with 100 drops of laudanum in each.

The Arabic solution may be thus prepared.

TAKE of gum arabic and tragacanth of each four ounces, juniper-berries and caraway-seeds of each an ounce, cloves bruised half an ounce; simmer gently in a gallon of water till the gums are dissolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it him often in a horn.

When a purge does not work, but makes the horse swell, and refuse his food and water, which is sometimes the effect of bad drugs or catching cold, warm diuretics are the only remedy; of which the following are recommended.

TAKE a pint of white-wine, nitre one ounce; mix with it a dram of camphire, dissolved in a little rectified spirit of wine; then add two drams of oil of juniper, and the same quantity of unrectified oil of amber, and four ounces of honey or syrup of marshmallows.

When a horse swells with much physic, do not suffer him to be rode about till he has some vent; but rather lead him gently in hand till some evacuation is obtained.

As it is observed, that horses more willingly take sweet and palatable things than those that are bitter and of an ill taste, care should be taken that the latter be given in balls, and that their drinks be always contrived to be as little nauseous as possible, and sweetened either with honey or liquorice. Those that are prepared with gross powders are by no means so agreeable to a horse as those made by infusion; as the former often clam the mouth, irritate the membranes about the palate and throat, and frequently occasion the cough they are intended to prevent.

Balls should be of an oval shape, and not exceed the

size

Clysters. size of a pullet's egg; when the dose is larger, it should be divided into two; and they should be dipt in oil, to make them slip down the easier.

The following cathartic balls are recommended by Mr Taplin*; the ingredients of which are differently proportioned, so as, to suit different circumstances in respect to strength, age, size, and constitution:

1. Socotorine aloes one ounce; India rhubarb two drachms; jalap and cream of tartar each one drachm; ginger (in powder) two scruples; essential oil of cloves and aniseed each twenty drops; syrup of buckthorn a sufficient quantity to form the balls.
2. Socotorine aloes ten drams; rhubarb, jalap, and ginger, each two drams; cream of tartar three drams, and syrup of buckthorn to make the ball.
3. Barbadoes aloes nine drams; jalap, Castile soap, and cream of tartar, of each two drams; diacrydium and ginger (in powder) each a dram; syrup of buckthorn sufficient to make the ball.
4. Barbadoes aloes ten drams; Castile soap and jalap (in powder) of each half an ounce; cream of tartar and ginger each two drams; oil of aniseed forty drops; of cloves twenty drops; which form into a ball with syrup of roses or buckthorn.

SECT. IV. *Of Clysters* †.

CLYSTERS administered to horses, are of greater importance in relieving them from many acute complaints, than is generally imagined; and it were to be wished, that, in place of the more expensive cordial drenches, &c. which are but too frequently given, in most of these cases, a simple clyster of warm water, or thin water-gruel, were substituted in their stead; the latter proving of great benefit, whilst the former too frequently prove hurtful.

Clysters serve not only to evacuate the contents of the intestines, but also to convey very powerful medicines into the system, when perhaps it is not practicable to do it by the mouth: for although they are only conveyed into the larger intestines, and perhaps hardly penetrate into the smaller; still they are extremely useful, by fomenting as it were the latter, and at the same time by softening the hardened excrement that is accumulated in the former, and rendering it so soft as to be expelled out of the body, by which flatulencies or other offending matters that may be pent up in them are likewise expelled. Besides, by their warmth and relaxing powers, they act as a fomentation to the bowels: hence they may be of considerable service in removing spasmodic constrictions in the bowels, carrying off flatulencies, and in preventing inflammation in the intestines, &c.; or, by conveying opiates to the parts affected, give speedy relief in cholics, &c. &c.

The use of emollient clysters in fevers are considerable. They act by revulsion, and relieve the head when too much affected. Besides, by throwing in a quantity of diluting liquor into the intestines, it not only relaxes and cleanses them, but may be said to cool the body in general; at the same time, a considerable portion of the liquid is absorbed and conveyed into the mass of blood, by which means it is diluted; and, in

particular complaints in the bowels, clysters give almost immediate relief, as the remedies, when judiciously prescribed, pass immediately to the parts affected, with little or no alteration from the powers of the body.

Nor is the use of clysters confined to medicines only: food and nourishment may be conveyed into the system in this way, when a horse is unable to swallow any thing by the mouth. Horses have frequently been supported for several days together by nourishing clysters, made of thick water-gruel, during violent inflammations or tumors in the throat, till such time as they have been disengaged or suppured.

Nor will these effects appear strange to those who have an acquaintance with the anatomical structure of the body. For the sake of those who have not, it may just be sufficient to observe, that certain vessels called lacteals, whose mouths open into the inner cavity of the intestines, absorb or drink up the chyle or nourishment that is produced from the food, and convey it into the mass of blood. The same process takes place when nourishment is conveyed into the intestines by the anus or fundament: only the food requires to be so far prepared, broken down and diluted with water, as to render it fit to be absorbed by the vessels mentioned above.

In administering clysters, it ought always to be observed, that the contents of the clyster be neither too hot nor too cold, as either of these extremes will surprise the horse, and cause him to eject or throw it out before it has had time to have any effect. Previous to introducing the clyster-pipe, the operator, after anointing his hand and arm with oil, butter, or hog's-lard (observing, at the same time, that the nails of his fingers are short); may introduce it into the rectum, and draw out the hardened dung gradually. This operation, in farriery, is termed *back-racking*; and becomes the more necessary, as it frequently happens that great quantities of hardened dung is, in some cases, collected in the rectum, and which the horse cannot void easily without assistance of this kind.

The composition of clysters should be extremely simple: on that account they will be easily prepared, and as easily administered, provided the operator is furnished with a suitable instrument for the purpose. The generality of clyster-pipes that are used, are by far too small and too short: although it may appear a kind of paradox, yet it is a fact, that a clyster-pipe of a larger size than the ordinary ones, and of a proper thickness, is much easier introduced into the anus than one that is considerably smaller. It is likewise obvious, that when the pipe is too short, it renders clysters of no use, because it cannot convey the clysters so far up into the intestines as is necessary for them to be retained; a small short pipe of six or eight inches long, is not capable of conveying the injection to the end of the rectum, which, in a horse of a middling size, is about 16 or 18 inches long.

But farther, after the hardened dung is taken out of the rectum by the operation above mentioned, the bladder being distended and full of urine, it cannot exert its contracting power immediately, so as to expel its contents; it therefore presses up the empty rectum, and forms as it were a kind of tumor in it: if the pipe

Clysters. is too short, it cannot reach beyond this rising in the rectum, which forms as it were a declivity back towards the anus; and hence the liquor regurgitates or flows back at the anus as soon as it is discharged from the pipe.

The smallness of the bag or bladder, which is generally proportioned to that of the pipe, is another very material objection to these instruments, as it seldom contains one quart of liquid; from which circumstance, very little benefit can be derived from the use of them in such large intestines as those of a horse. Doctor Bracken, in his first volume, page 203. has a very judicious remark on the use of clysters. He observes, that "the colon of a horse seems to be three guts, by reason of the two necks of about half a yard each, is drawn up into many cells or purses by means of two ligaments, one of which runs along the upper and the other the under side of it, which, with the assistance of a valve or flap at its beginning, hinder the excrements either from returning back into the small guts, or falling too soon downwards, before the chyle or milky substance prepared from the food be sent into its proper vessels. And, indeed, the cæcum or blind gut, which is the first of the three larger guts, seems to be so contrived in the manner of a valve, to hinder the aliment and chyle from passing too soon into the colon; for, if the aliment and chyle were not in some measure hindered in their passage through these large guts, the body could not be sufficiently supplied with nourishment. The first of these colons is about a yard and a half in length, the second about a yard, and the third, or that part which joins the rectum or arse-gut, near six yards in length; so that the colon of a horse 14 hands high, may be said to be nearly eight yards and a half long; and, from it, along the rectum or straight gut to the anus, where the excrements are discharged, is not above half a yard; so that it is plain, clysters operate mostly in the colon; though I must say they are given in too small quantities; for what signifies two quarts of liquor in a gut nine yards long, and four or five inches diameter, in a natural state; but in the colic, it is so distended with flatulencies, that its diameter exceeds seven or eight inches, as I have frequently observed in those dying of that distemper."

Large syringes are frequently used for the purpose of giving clysters; but of all the instruments ever invented, they seem the most improper for horses. The shortness and smallness of their ivory pipes, are not only a material objection against the use of them, but they are apt to tear and wound the gut; for if a horse should prove restless, either from pain, as in cases of the gripes, or from viciousness, the syringe and pipe being quite inflexible, in the struggle to throw up the injection the gut may be wounded or hurt, by which a discharge of blood and other bad consequences may follow. But although there was not the least chance of their hurting the horse or wounding the gut, yet the force with which they throw up the liquor, always causes a surprise, of course a resistance, attended with a vigorous effort to throw it out; which indeed frequently happens before the pipe of the syringe is withdrawn, and frequently upon the operator.

The most proper instrument for the giving of cly-

Clysters. sters, is a simple bag or ox-bladder, which will hold two or three quarts, tied to the end of a wooden pipe about 14 or 15 inches long, one inch and a half diameter where the bag is tied, and of a gradual taper to the extremity, where the thickness should suddenly increase, and be rounded off at the point, and made as smooth as possible; the perforation or hole through the pipe may be made sufficiently large, so as to admit the end of a common funnel, for pouring in the liquor into the bag. By the flexibility of the bladder at the end of this instrument, no danger can happen to the horse; the clyster is conveyed so far up into the intestines that it will be retained; it causes no surprise (providing the liquor be neither too hot nor too cold, but milk warm), as no other force is required to throw it up than the holding the bag a little higher than the level of the pipe; by which means the liquor flows gently into the gut, without any surprise to the horse. After using the bag, it may be blown full of wind, a cork put into the pipe, and hung up in some dry place to prevent it from rotting; by which means it will last a considerable time.

Clysters are distinguished by different names, which denote the quality of the ingredients of which they are composed, as emollient, laxative, diuretic, anodyne, &c. As the more general use of clysters, in the practice of farriery, would be attended with the most salutary effects, especially in acute diseases, where the speediest assistance is necessary, we shall here subjoin some forms of recipes for composing them, together with the cases in which they may be administered with advantage.

1. *Emollient clyster.* Two or three quarts of thin water-gruel, salad oil and coarse sugar, of each six ounces. Dissolve the sugar in the water-gruel, then add the salad oil—Give it milk warm.
2. *Laxative clyster.* Two or three quarts of thin water-gruel, Glauber's salts eight ounces, salad oil six ounces.

When Glauber's salts are not at hand, common salt may be used in its stead.

A great variety of recipes might be added for making clysters, composed of the infusion of different herbs, seeds, &c. But the above ingredients are always easily got; and they will be found to answer all the intentions required under this head, which is to soften the hardened excrements, to lubricate the intestines, and, by exciting a gentle stimulus, promote a free discharge of their contents; which, when once obtained, seldom fails of giving relief in inflammatory cases, spasms, &c.

3. *Purging clyster.* Infuse two ounces of senna in two quarts of boiling water; strain it off; then add syrup of buckthorn and common oil, of each four ounces.

This clyster will operate more briskly than the former, and, on that account, may be preferred when an immediate or speedy discharge is necessary.

4. *Anodyne clyster.* The jelly of starch, or infusion of lintseed, one pint; liquid laudanum, one ounce or about two table spoonfuls.

When there is reason to apprehend inflammation in the bowels, opium may be given in place of laudanum, from 20 to 30 grains, in proportion to the urgency of the symptoms; it ought to be well triturated or rubbed.

Clysters. bed in a mortar, with a little of the liquid, till it has thoroughly dissolved. The smallness of the quantity of liquid here recommended, gives it the better chance of being the longer retained, as the good effects to be derived from the opium depend entirely on this circumstance. This clyster is proper to be given in violent gripings, attended with purging, in order to blunt the sharpness of the corroding humours, and to allay the pain usually attending in such cases. The starch will in some measure supply the deficiency of the natural mucus, or covering of the intestines, which has been carried off by violent purging. It may be repeated, if the symptoms continue violent, only diminishing the quantity of laudanum or of the opium.

5. *Nourishing clyster.* Thick water-gruel three quarts. When clysters of this kind are found necessary, they may be given four or five times in the day, according as circumstances may require; they are of considerable service in cases where the horse cannot eat sufficiently to support him, or swallow any thing, from inflammation of the throat, jaws, &c. or in convulsions, attended with a locked jaw, &c.

6. *Diuretic clyster.* Venice turpentine two ounces; Castile soap one ounce. Dissolve the soap in two quarts of warm water; then add the turpentine, after it has been well beat up with the yolks of two eggs.

This diuretic clyster is of great use in the strangury, and obstructions in the urinary passages; and as it is immediately applied to the parts affected, it seldom fails of giving relief, and has a much better effect when prescribed in this manner than when given by the mouth: by this last way it mixes with the whole mass of fluids, and may lose a considerable portion of its diuretic quality before it reaches the kidneys; but, by being administered in the form of a clyster, it is readily absorbed by the neighbouring vessels, and promotes a free discharge of urine.

It would be needless to add more forms of clysters, as those above mentioned will answer most cases, without any material alteration, but what may be easily supplied by the judicious practitioner.

There are a variety of cases where clysters may be administered with great success, besides those already hinted at; as in inflammatory fevers, spasmodic constrictions, and cholicky complaints in the bowels; in recent coughs, apoplexy, convulsions, paralytic complaints, or swelling of the belly whether from air pent up in the bowels or from hardened excrements; in cases where horses are troubled with worms, as the ascarides which lodge in the lower part of the intestines, or when bott-worms are observed sticking in the anus, or voided with the dung; in very costive habits, before laxative or opening medicines are given by the mouth; in wounds which penetrate deep into the muscular or tendinous parts, or in the belly, &c. in inflammations of the eyes, or when the head seems particularly affected; in inflammatory swellings on any part of the body, when a horse cannot swallow any food, &c. whether it proceeds from spasm in the muscles of the throat, inflammations, or swellings. Clysters composed of mucilaginous substances, as starch, lintseed, &c. are of great benefit in violent diarrhoeas or looseness, whether it proceeds from a natural discharge, or from too strong purging medicines.

It ought always to be remembered, that clysters should be repeated frequently, till such time as the disorder for which they are given is either removed or greatly abated. This injunction may be the more readily complied with, as the administering clysters to horses is not attended either with much trouble or disturbance to them.

SECT. V. Rowels and Setons *.

* From the same.

1. ROWELS for horses, answer the same purpose as issues in the human body. The method of introducing them is by making an incision through the skin, about three-eighths of an inch long, and then separating the skin from the flesh with the finger, or with a blunt horn, all round the orifice, as far as the finger will easily reach; then introducing a piece of leather, very thin, shaped round, about the size of a crown piece, having a large round hole in the middle of it. Previous to introducing the leather, it should be covered with lint or tow, and dipped into some digestive ointment; a pledget of tow, dipped in the same ointment, should likewise be put into the orifice, in order to keep out the cold air: the parts around it soon swell, which is followed with a plentiful discharge, from the orifice, of yellow serum or lymph; and, in two or three days at most, the discharge turns into thick gross white matter: the rowel is then said to suppurate.

These artificial vents act by revulsion or derivation; and hence they become of great use in many cases, as they empty the surrounding vessels by a regular flow discharge of their contents, and are even of great service when there is a redundancy or fulness of humours in general, which may require a gradual discharge, in preference to greater evacuations by purging medicines, &c. Rowels should be placed (especially in some particular cases) as near the affected part as possible; and, at all times, they ought to have a depending orifice, in order to admit of a free discharge of the matter that may be contained in them.

The parts where they ought to be inserted, and where they are found to answer best, are the belly, inside of the thighs, the breast, and outside of the shoulders and hips; they are sometimes, but very injudiciously, put in between the jaw-bones under the root of the tongue, where they never come to a proper suppuration, on account of the constant motion of the parts in eating, &c. neither do they answer any good purpose from being placed in that situation. In some disorders it is found necessary to put in several of them at once, in order to make a sudden revulsion from the parts affected; but this should be determined by the horse's age, strength, and circumstances that require them.

But though rowels are found very beneficial in some cases, yet, like a number of other operations common to horses, they sometimes, by the improper use of them, become hurtful to the constitution; and, in some diseases, they frequently, instead of suppurating, turn gangrenous. Thus, in violent fevers, where they are frequently very improperly applied, they never suppurate properly: whether this proceeds from the quickness of the pulse, together with the violent rapidity with which the fluids in general are then carried through the vessels, or from the violent agitation in which the whole system is thrown,

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Setons.

thrown, it is difficult to determine; but experience confirms the observation, when properly attended to. In such cases, the surrounding parts where the rowel is placed, seldom or never swell (as in the ordinary course, when they suppurate properly), but appear dry, or much in the same state as when they were first put in; there is little or no discharge from the orifice; and the little that does come is thin, ichorous, and bloody. In such cases, they ought to be taken out immediately, and the parts well fomented with a strong infusion of camomile, or an emollient poultice applied, if it can be properly fixed, and frequently repeated; at intervals, the parts ought likewise to be bathed with ardent spirits, as that of wine, turpentine, &c. covering the parts from the external air; and, provided there is no fever at the time, two or three ounces of Peruvian bark may be given through the day, either made into balls or given in a liquid; and this continued till the threatening symptoms are removed.

Rowels are of great use in carrying off rheums or defluxions from the eyes; in great swellings of the glands, &c. about the throat and jaws, which threaten a suffocation; or when the head seems particularly affected, as in the vertigo or staggers, apoplexy, &c. &c.; in recent lameness; swellings of the legs and heels, attended with a discharge of thin ichorous matter, &c.; in large and sudden swellings in any part of the body; or when extravasations of the fluids have taken place, from blows, bruises, &c. or when a horse has had a severe fall, &c. and in a variety of other cases, which will occur to the judicious practitioner.

2. Setons are of great use in carrying off matter from deep seated tumors or abscesses in different parts of the body. They ought all times to be used in preference to making deep incisions into the muscular parts, which not only disfigure horses, but such deep incisions are very difficult to heal up in them, on account of the situation of some of these tumors, and the horizontal position of the body, which is unfavourable in many cases for procuring a depending opening in order to carry off the matter, as in tumors on the back, withers, and upper part of the neck immediately behind the ears, which are very common. Besides the horizontal position of the body, the natural restlessness and impatience of horses renders it impracticable to fix proper bandages on those elevated parts; the situation of them likewise will not admit of proper dressings being fixed on them with any degree of certainty of their remaining for any length of time; by which means the openings made into such tumors or abscesses are frequently left bare, and exposed to the cold air, &c.: hence such openings degenerate into very foul ulcers, and produce a great deal of proud flesh, and which require to be repeatedly cut away with the knife, as the strongest caustics that can be applied are not sufficient to keep it under.

Setons are introduced by long, thin, sharp-pointed instruments or needles, shaped like a dart at the point, and having at the other extremity an eye to receive the end of the cord, which is to be left in the tumor. The size of the instrument may be determined by that of the tumor, and the thickness of the cord which is to follow it, and which at all times ought to be smaller than the perforation made by the point of the needle. Every practitioner in farriery should always have a

number of these needles by him, of different sizes, that is, from 6 to 14 or 15 inches long, a little bended on the flat or under side. The following is the method of applying them in cases of tumors, &c. When the matter is found to fluctuate in the tumor, the needle, armed with a cord at the other end, is to be introduced at the upper part of it, and the sharp point of the instrument directed to, and brought out at the under or lowermost part of the tumor, including the whole length of it; or, if needful, through the sound muscular flesh on the under part, in order to make a depending orifice for the matter to run freely off; the cord should be dipped in some digestive ointment, and then tied together at both ends with a thread, in order to prevent its slipping out. But if, from the length of the perforation, the cord should not admit of being tied together at the ends, a small button of wood, or some such substance, may be fixed at each end: only, from this circumstance, the cord will require, when shifted, occasionally to be drawn upwards and downwards; whereas, when the ends of it are tied together, it forms a circle, and may always be shifted downwards to the lower orifice. When the matter in the tumor appears to be wholly discharged or dried up, and no thickness appearing but where the cord is, it may then be cut out, and the orifices suffered to heal up.

When the needle for introducing the seton is to pass near to any large blood-vessels or nerves; in order to prevent the chance of their being wounded, it may be concealed in a canula or case, open at both ends; and after an opening is made at the upper part of the tumor sufficient to admit the needle with its case, it may then be directed with safety to pass the blood-vessels, &c. it may then be pushed forward through the canula and the opposite side of the tumor, and, having only the common teguments to perforate, all danger will be avoided.

SECT. VI. Of Alterative Medicines.

By alteratives, or altering medicines, are to be understood such as, having no immediate sensible operation, gradually gain upon the constitution, by changing the humours or juices from a state of distemperature to health. This intention in some cases may perhaps be effected by correcting the acrimony of the juices, and accelerating the blood's motion; and in others by attenuating or breaking its particles, and dividing those cohesions which obstruct the capillaries or finer vessels, and so promote the due secretions of the various fluids. It is certain, that many have but an indifferent opinion of a medicine that does not operate externally, and gratify their senses with a quantity of imagined humours ejected from the body: but let such people remember, that there are good humours as well as bad, which are thrown off together; that no evacuating medicine has a power of selecting or separating the bad from the good; and consequently that they are thrown out only in a proportionate quantity. These few hints may be sufficient to convince the judicious reader of the great advantages arising from alteratives, and the preference due to them in most cases over purgatives; unless it could be proved, as already mentioned, that the latter could cull out and separate from the blood the bad humours solely, leaving the good behind: but this

terative medicines. this selective power has long been justly exploded as ridiculous and uncertain; since it is plain, that all kinds of purging medicines differ only in degree of strength, and operate no otherwise upon different humours than as they stimulate more or less.

We shall therefore take this opportunity of recommending some alterative medicines which are not so generally known as they ought to be; and that too on the surest grounds, a proper experience of their good effects in repeated trials. The first, then, is nitre or purified salt-petre; which has long been in great esteem, and perhaps is more to be depended on in all inflammatory fevers than any other medicine whatever: but besides this extensive power of allaying inflammatory disorders, it is now offered as an alterative remedy, taken in proper quantities for surfeits, molten-grease, hide-bound, grease-heels, &c. And as it has been known to succeed even in the cure of the farcy; what other distempers in horses, arising from vitiated fluids, may it not be tried on, with a strong probability of success? This great advantage will arise from the use of this medicine over most others, that, as its operation is chiefly by urine, it requires no confinement or cloathing; but the horse may be worked moderately throughout the whole course. This medicine has been found equally efficacious (by many trials made in one of our hospitals) in correcting the acrimony of the juices, and disposing the most obstinate and inveterate sores to heal up; and hence probably it came recommended as an alterative to our horses.

The quantity of nitre given at a time should be from two to three ounces a-day; let it be finely powdered, and then mix with it by little at a time as much honey as will form it into a ball: give it every morning fasting for a month; or it may be given at first for a fortnight only, intermitting a fortnight, and then repeat it. If it be observed that the horse shows an uneasiness at the stomach after taking it, a horn or two of any liquor should be given after it, or it may be dissolved at first in his water, or mixed with his corn; though the ball, where it agrees, is the easiest method of giving.

When horses take drinks with great reluctance, powders must be given in their feeds: thus crude antimony, or liver of antimony finely powdered, may be given to the quantity of half an ounce, night and morning; but in all surfeits, gum guaiacum mixed with antimony is found more efficacious. Thus,

TAKE of crude antimony finely powdered, or, where it can be afforded, cinnabar of antimony, and gum guaiacum, of each a pound: mix together with an oily pestle to prevent the gum's caking: divide the whole into 32 doses, viz. an ounce each dose: let one be given every day in the evening-feed.

Or, TAKE of cinnabar of antimony, gum guaiacum, and Castile or Venice soap, of each half a pound; salt of tartar, four ounces: beat them up into a mass, and give an ounce every day. To these may be added very advantageously an ounce and an half of camphor.

Æthiops mineral, given to the quantity of half an ounce a-day, is a very good sweetener and corrector of the blood and juices; but it has been observed, after having been taken a week or ten days, to make some horses slabby, and unable to chew their hay and oats;

and the same symptoms have arisen, where only two drams of crude mercury has been given, and continued about the same space of time.

Diet-drinks—1. A decoction of logwood, prepared like that of guaiacum, is also successfully given in surfeits.

2. Lime-water prepared with shavings of saffras and liquorice, is a good diet-drink to sweeten and correct a horse's blood; and may be given with the nitre-balls for that purpose.

3. Tar-water also, may in many cases be well worth trial: but let it be remembered, that all medicines of this kind should be continued a considerable time in obstinate cases.

SECT. VII. Of Colds.

By taking cold, we mean that the pores and outlets of the skin (which in a natural healthy state of body are continually breathing out a fine fluid, like the steam arising from hot water, or smoke from fire) are so far shut up, that these steams, or perspirable matter, not having a free passage through them, are hindered from going off in the usual manner; the consequence of which is, their recoiling on the blood, vitiating its quality, overfilling the vessels, and affecting the head, glands or kernels of the neck and throat, the lungs, and other principal parts.

To enumerate the various causes of colds would be endless: the most usual are, riding horses till they are hot, and suffering them to stand in that condition where the air is cold and piercing; removing a horse from a hot stable to a cold one, and too suddenly changing his cloathing; whence it is that horses often catch such severe colds after they come out of dealers hands, and by not being carefully rubbed down when they come in hot off journeys.

Where there is a constant attention and care, the effects of cold are not only soon discovered, but an observation may be very early made to what part it more immediately directs its attack. For instance, if the nervous system be the most irritable, the affection is quickly perceived in the eyes; if the glandular, upon the neck, throat, under the ears, or in the head: or if more particularly the system of circulation has been affected, the consequences are soon apparent upon the lungs; and will be exerted more or less in a cough, or difficulty of breathing, according to the severity of attack, from the repulsion of perspirable matter, and its consequent absorption into the circulation. As soon as the horse is in this state, a symptomatic fever attends; which is to be understood as no more than a degree of febrile heat or irritability dependant on the original cause, which gradually ceases as the primary disease is found to decline.

From an affection of the different parts above specified, various disorders ensue, which are treated of under their proper heads. Here we have only to consider that kind of cold fixed on the lungs, which produces cough; and which, if taken in its first stage, generally yields to very simple remedies.

As soon as the attack has been observed, bleeding should be instantly performed, according to symptoms, size, state, and condition; and the blood preserved a few hours to ascertain its state: if livid or black, with

Colds.

Colds.

with a coat of size upon its surface, there is no doubt of its viscosity, and of the obstructed circulation of that fluid through the finer vessels of the lungs. In three or four hours after bleeding, give a mash prepared as follows:

TAKE of bran and oats, equal parts. Pour on boiling water a sufficient quantity: then stir in aniseed and liquorice powders, each one ounce; honey, four ounces. In two hours after the mash give a gallon or six quarts of soft water moderately warm, in which has been dissolved two ounces of nitre.

These mashes Mr Taplin directs to be "continued every night and morning, giving a moderate feed of dry oats in the middle of the day, good sweet hay in small quantities, and the same proportion of nitre to be repeated in the water after each mash. To these must be added the necessary regulations of good dressing and gentle exercise, which in general soon effect the cure of such colds as are counteracted upon the first attack."

To humour those who are not satisfied without some formal compositions, the following may be exhibited when the fever does not run high.

Pectoral Horse-ball. TAKE of the fresh powders of aniseed, elecampane, carraway, liquorice, turmeric, and flour of brimstone, each three ounces; juice of liquorice four ounces, dissolved in a sufficient quantity of mountain; saffron powdered half an ounce, salad-oil and honey half a pound, oil of aniseed one ounce: mix together with wheat-flour enough to make them into a paste.

Or the following from Dr Bracken.

TAKE aniseed, carraway seed, and greater cardamoms, finely powdered, of each one ounce, flour of brimstone two ounces, turmeric in fine powder one ounce and a half, saffron two grains, Spanish juice dissolved in water two ounces, oil of aniseed half an ounce, liquorice powder one ounce and a half, wheat-flour a sufficient quantity to make into a stiff paste by beating all the ingredients well in a mortar.

These balls consist of warm opening ingredients; and, given in small quantities, about the size of a pullet's egg, will encourage a free perspiration.

To a horse loaded with flesh, a rowel may sometimes be necessary, as may also a gentle purge or two to some when the distemper is gone off.

When the disorder has been neglected, and made a rapid progress, should the cough be violent and constant, the horse very dull and refusing his food, and the symptomatic fever run high, the blood will consequently prove as before described. In this case the symptoms will not perhaps yield to the above plan so soon as may be wished. It will therefore be necessary to repeat the bleeding in two or three days at farthest, according to circumstances. The mashes may at the same time be altered to equal parts of malt and bran, scalded with boiling water; into which, when nearly cool enough for the manger, stir elecampane, aniseed and liquorice powders, each one ounce: this mash to be repeated every night and morning; continuing also the noon-feed dry, and the nitre two ounces in the water, as before directed. By a due attention to these measures, relief will soon be obtained, and a cure generally effected in the course of a few days: Whereas,

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by delay or neglect, a confirmed cough, asthma, broken-wind, or consumption, may be the consequence.

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general

SECT. VIII. Of Fevers in general.

I. THE symptoms of a fever are, Great restlessness; the horse ranging from one end of his rack to the other; his flanks beat; his eyes are red and inflamed; his tongue parched and dry; his breath is hot, and smells strong; he loses his appetite, and nibbles his hay, but does not chew it, and is frequently smelling to the ground; the whole body is hotter than ordinary (though not parched, as in some inflammatory disorders); he dungs often, little at a time, usually hard, and in small bits; he sometimes stales with difficulty, and his urine is high-coloured; and he seems to thirst, but drinks little at a time and often; his pulse beats full and hard, to 50 strokes and upwards in a minute.

The first intention of cure is bleeding, to the quantity of two or three quarts, if the horse is strong and in good condition: then give him a pint of the following drink, four times a-day; or an ounce of nitre, mixed up into a ball with honey, may be given thrice a-day instead of the drink, and washed down with three or four horns of any small liquor.

TAKE of baum, sage, and camomile-flowers, each a handful, liquorice-root sliced half an ounce, salt prunel or nitre three ounces; infuse in two quarts of boiling water; when cold, strain off, and squeeze into it the juice of two or three lemons, and sweeten with honey.

As the chief ingredient to be depended on in this drink is the nitre, it may perhaps be as well given in water alone; but as a horse's stomach is soon palled, and he requires palatable medicines, the other ingredients may in that respect have their use. Soleysel for this purpose advises two ounces of salt of tartar, and one of sal ammoniac, to be dissolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley-flour to qualify the unpleasant taste: this may be given every day, and is a useful medicine.

His diet should be scalded bran, given in small quantities; which if he refuses, let him have dry bran sprinkled with water: put a handful of picked hay into the rack, which a horse will often eat when he will touch nothing else; his water need not be much warmed, but should be given often and in small quantities: his cloathing should be moderate; too much heat and weight on a horse being improper in a fever, which scarce ever goes off in critical sweats (as those in the human body terminate), but by strong perspiration.

If in a day or two he begins to eat his bran and pick a little hay, this method with good nursing will answer: but if he refuses to feed, more blood should be taken away, and the drinks continued; to which may be added two or three drams of saffron, avoiding at this time all hotter medicines: the following glyster should be given, which may be repeated every day, especially if his dung is knotty or dry.

TAKE two handfuls of marshmallows, and one of camomile flowers; fennel-seed an ounce; boil in three quarts of water to two; strain off, and add four

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four ounces of treacle, and a pint of linfeed oil or any common oil.

Two quarts of water-gruel, fat broth, or pot-liquor, with the treacle and oil, will answer this purpose; to which may be added a handful of salt. These sorts of glysters are more proper than those with purging ingredients.

The following opening drink is very effectual in those fevers; and may be given every other day, when the glysters should be omitted; but the nitre-balls or drink may be continued, except on those days these are taken.

TAKE of cream of tartar and Glauber's salts, each four ounces; dissolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jalap, to quicken the operation in some horses.

Four ounces of Glauber's salts, or cream of tartar, with the same quantity of lenitive electuary, may be given for the same purpose, if the former should not open the body sufficiently.

In four or five days the horse generally begins to pick his hay, and has a seeming relish for food; tho' his flanks will heave pretty much for a fortnight: yet the temper of his body and return of appetite show, that nothing more is requisite to complete his recovery than walking him abroad in the air, and allowing plenty of clean litter to rest him in the stable.

This method of treating a fever is simple, according to the laws of nature; and is confirmed by long experience to be infinitely preferable to the hot method.

The intention here is to lessen the quantity of blood, promote the secretion of urine and perspiration, and cool and dilute the fluids in general.

2. There is another sort of fever that horses are subject to, of a more complicated and irregular nature than the former; which, if not properly treated, often proves fatal.

The signs are, A slow fever, with languishing, and great depressions: the horse is sometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moist and languid: he has a continual moisture in his mouth, which is the reason he seldom cares to drink, and when he does, it is but little at a time. He feeds but little, and leaves off as soon as he has eat a mouthful or two; he moves his jaws in a feeble loose manner, with an unpleasant grating of his teeth; his body is commonly open; his dung soft and moist, but seldom greasy; his staling is often irregular, sometimes little, at other times profuse, seldom high-coloured, but rather pale, with little or no sediment.

When a horse's appetite declines daily, till he refuses all meat, it is a bad sign. When the fever doth not diminish, or keep at a stand, but increases, the case is then dangerous. But when it sensibly abates, and his mouth grows drier, the grating of his teeth ceases, his appetite mends, and he takes to lie down (which perhaps he has not done for a fortnight), these are promising signs. A horse in these fevers always runs at the nose, but not the kindly white discharge, as in the breaking of a cold, but of a reddish or greenish dusky colour, and of a consistence like glue, and sticks like turpentine to the hair on the inside of the nostrils: If this turns to a gleet of clear thin water, the horse's

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hide keeps open, and he mends in his appetite; these are certain signs of recovery.

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The various and irregular symptoms that attend this slow fever, require great skill to direct the cure, and more knowledge of the symptoms of horses diseases than the generality of gentlemen are acquainted with. The experienced farrier should therefore be consulted and attended to, in regard to the symptoms; but very seldom as to the application of the remedy, which is generally above their comprehension; though it may be readily selected, by duly attending to the observations here inculcated.

First, then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his strength, fulness, inward foreness, cough, or any tendency to inflammation. After this, the fever-drink first above-mentioned may be given, with the addition of an ounce of snake-root, and three drams of saffron and camphor dissolved first in a little spirit of wine; the quantity of the nitre may be lessened, and these increased as the symptoms indicate.

The diet should be regular; no oats given, but scalded or raw bran sprinkled; the best flavoured hay should be given by handfuls, and often by hand, as the horse sometimes cannot lift up his head to the rack.

As drinking is so absolutely necessary to dilute the blood, if the horse refuses to drink freely of warm water or gruel, he must be indulged with having the chill only taken off by standing in the stable: nor will any inconvenience ensue, but oftener an advantage; for the nauseous warmth of water, forced on horses for a time, pals their stomachs, and takes away their appetites, which the cold water generally restores.

Should the fever after this treatment increase, the horse feed little, stale often, his urine being thin and pale, and his dung sometimes loose, and at other times hard; should the moisture in his mouth continue, his skin being sometimes dry and at others moist, with his coat looking starting and furfited: upon these irregular symptoms, which denote great danger, give the following balls, or drink; for in these cases there is no time to be lost.

TAKE of contrayerva-root, myrrh, and snake-root, powdered, each two drams, saffron one dram, mithridate or Venice treacle half an ounce; make into a ball with honey, which should be given twice or thrice a-day, with two or three horns of an infusion of snake-root sweetened with honey; to a pint and a half of which may be added half a pint of treacle-water or vinegar, which latter is a medicine of excellent use in all kinds of inflammatory and putrid disorders, either external or internal.

Should these balls not prove successful, add to each a dram of camphor, and, where it can be afforded, to a horse of value, the same quantity of castor. Or the following drink may be substituted in their stead for some days.

TAKE contrayerva and snake-root of each two ounces, liquorice-root one ounce, saffron two drams; infuse in two quarts of boiling water close covered for two hours; strain off, and add half a pint of distilled vinegar, four ounces of spirit of wine, wherein half an ounce of camphor is dissolved, and two ounces of mithridate or Venice treacle;

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treacle; give a pint of this drink every four, six, or eight hours.

Should the horse be colic, recourse must be had to glysters, or the opening drink: should he purge, take care not to suppress it, if moderate; but if, by continuance, the horse grows feeble, add diascordium to his drinks, instead of the mithridate; if it increases, give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine in these kinds of putrid fevers; being both active and attenuating, and particularly calculated to promote the secretions of urine and perspiration.

Regard should also be had to his staling; which if in too great quantities, so as manifestly to depress his spirits, should be controlled by proper restringents, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiss this way, and stales so little as to occasion a fulness and swelling of the body and legs, recourse may be had to the following drink:

TAKE of salt prunella, or nitre, one ounce; juniper-berries, and Venice turpentine, of each half an ounce: make into a ball with oil of amber.

Give him two or three of these balls, at proper intervals, with a decoction of marsh-mallows sweetened with honey.

But if, notwithstanding the method we have laid down, a greenish or reddish gleet is discharged from his nostrils, with a frequent sneezing; if he continues to lose his flesh, and becomes hide-bound; if he altogether forsakes his meat, and daily grows weaker; if he swells about the joints, and his eyes look fixed and dead; if the kernels under his jaws swell, and feel loose: if his tail is raised, and quivers; if his breath smells strong, and a purging ensues with a discharge of fetid dark-coloured matter; his case may then be looked on as desperate, and all future attempts to save him will be fruitless.

The signs of a horse's recovery are known by his hide keeping open, and his skin feeling kindly; his ears and feet will be of a moderate warmth, and his eyes brisk and lively; his nose grows clean and dry; his appetite mends, he lies down well, and both stales and dungs regularly.

Be careful not to overfeed him on his recovery: let his diet be light, feeds small, and increased by degrees as he gets strength; for, by overfeeding, horses have frequent relapses or great surfeits, which are always difficult of cure.

If this fever should be brought to intermit, or prove of the intermitting kind, immediately after the fit is over give an ounce of Jesuit's bark, and repeat it every six hours till the horse has taken four or six ounces: should eruptions or swellings appear, they ought to be encouraged; for they are good symptoms at the decline of a fever, denote a termination of the distemper, and that no further medicines are wanted.

The true reasons, perhaps, why so many horses miscarry in fevers, are, that their masters, or doctors, will not wait with patience, and let nature have fair play: that they generally neglect bleeding sufficiently at first; and are constantly forcing down fugar-sops, or other food, in a horn, as if a horse must be starved in a few days if he did not eat: then they ply him twice or

thrice a-day with hot medicines and spirituous drinks, which (excepting a very few cases) must be extremely pernicious to a horse, whose diet is naturally simple, and whose stomach and blood, unaccustomed to such heating medicines, must be greatly injured, and without doubt are often inflamed by such treatment.

Dilute the blood with plenty of water, or white drink; let his diet be warm bran-mashes, and his hay sprinkled. Should the fever rise, which will be known by the symptoms above described, give him an ounce of nitre thrice a-day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a-week; or an ounce of salt of tartar may be given every day, dissolved in his water, for that purpose, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a-day, with an infusion of liquorice-root sweetened with honey; to which may be added, when the phlegm is tough, or cough dry and husky, a quarter of a pint of linseed or fallad oil, and the same quantity of oxymel squills.

The following cooling purge is very proper to give at the decline of the distemper, and may be repeated three or four times.

TAKE two ounces of fenna, aniseed and fennel bruised each half an ounce: salt of tartar three drams; let them infuse two hours in a pint of boiling water; strain off, and dissolve in it three ounces of Glauber's salt, and two of cream of tartar; give for a dose in the morning.

This purge generally works before night very gently; and in fevers, and all inflammatory disorders, is infinitely preferable to any other physic.

Before we close this section on fevers, it may be no improper hint to the curious, to take notice, that a horse's pulse should more particularly be attended to than is customary, as a proper estimate may thereby be made both of the degree and violence of the fever present, by observing the rapidity of the blood's motion, and the force that the heart and arteries labour with to propel it round. The highest calculation that has been made of the quickness of the pulse in a healthy horse, is, that it beats about 40 strokes in a minute; so that in proportion to the increase above this number, the fever is rising, and if farther increased to above 50 the fever is very high.

How often the pulse beats in a minute may easily be discovered by measuring the time with a stop-watch or minute sand-glass, while your hand is laid on the horse's near side, or your fingers on any artery: those which run up on each side the neck are generally to be seen beating, as well as felt, a little above the chest; and one within side each leg may be traced with the finger.

A due attention to the pulse is so important an article, in order to form a proper judgment in fevers, that it would appear amazing it has so much been neglected, if one did not recollect, that the generality of farriers are so egregiously ignorant, that they have no manner of conception of the blood's circulation, nor in general have they ability enough to distinguish the difference between an artery and a vein.—With such pretty guardians do we intrust the healths and lives of the most valuable of animals!

Pleurisy, Inflammation of the Lungs, &c. SECT. IX. *Of a Pleurisy, and an Inflammation of the Lungs, &c.*

1. THESE disorders have scarce been mentioned by any writer on farriery before Mr Gibson; who, by frequently examining the carcases of dead horses, found them subject to the different kinds of inflammations here described.

In order to distinguish these disorders from others, we shall describe the symptoms in Mr Gibson's own words.

"A pleurisy, then, which is an inflammation of the pleura; and a peripneumony, which is an inflammation of the lungs; have symptoms very much alike; with this difference only, that in a pleurisy a horse shows great uneasiness, and shifts about from place to place; the fever, which at first is moderate, rises suddenly very high; in the beginning he often strives to lie down, but starts up again immediately, and frequently turns his head towards the affected side, which has caused many to mistake a pleuritic disorder for the gripes, this sign being common to both, though with this difference: in the gripes, a horse frequently lies down and rolls; and, when they are violent, he will also have convulsive twitches, his eyes being turned up, and his limbs stretched out, as if he were dying; his ears and feet are sometimes occasionally hot, and sometimes as cold as ice; he falls into profuse sweats, and then into cold damps; strives often to stale and dung, but with great pain and difficulty; which symptoms generally continue till he has some relief: but, in a pleurisy, a horse's ears and feet are always burning hot, his mouth parched and dry, his pulse hard and quick: even sometimes, when he is nigh dying, his fever is continued and increasing; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the least offer to change his posture, but stands panting with short stops, and a disposition to cough, till he has some relief, or drops down.

"In an inflammation of the lungs, several of the symptoms are the same; only in the beginning he is less active, and never offers to lie down during the whole time of his sickness; his fever is strong, breathing difficult, and attended with a short cough: and whereas, in a pleurisy, a horse's mouth is generally parched and dry; in an inflammation of the lungs, when a horse's mouth is open, a ropy slime will run out in abundance; he gleans also at the nose a reddish or yellowish water, which sticks like glue to the inside of his nostrils.

"In a pleurisy, a horse heaves and works violently at his flanks, with great restlessness, and for the most part his belly is tucked up: but in an inflammation of the lungs, he always shows fulness; the working of his flanks is regular, except after drinking and shifting his posture; and his ears and feet are for the most part cold, and often in damp sweats."

2. The cure of both these disorders is the same. In the beginning a strong horse may lose three quarts of blood, the next day two quarts more; and, if symptoms do not abate, the bleedings must be repeated, a quart at a time; for it is speedy, large, and quick-repeated bleedings that are in these cases chiefly to be depended on. But if a horse has had any previous weak-

ness, or is old, you must bleed him in less quantities, and oftener. Mr Gibson recommends rowels on each side the breast, and one on the belly; and a blistering ointment to be rubbed all over his brisket upon the foremost ribs.

The diet and medicines should be both cooling, attenuating, relaxing, and diluting. After the operation of bleeding, therefore, Mr Taplin * directs "to have ready some bran and very sweet hay cut small, and scalded together; which place hot in the manger, that the fumes may be imbibed as an internal fomentation to relax the rigidity of the glands, and excite a discharge from the nostrils so soon as possible. The very nature of this case, and the danger to which the horse is exposed, sufficiently point out the propriety and consistency of exerting all possible alacrity to obtain relief, or counteract the disease in its first stage: therefore let the fumigation of scalded bran and hay be repeated every four or five hours, and the following decoction prepared without delay:

"PEARL barley, raisins split, and Turkey figs sliced, each six ounces; stick liquorice bruised, two ounces. Boil these in a gallon of water till reduced to three quarts; strain off; and, while hot, stir in one pound of honey, and, when cold, a pint of distilled vinegar; giving an ounce of nitre in a pint of this decoction every four, five, or six hours, according to the state and inveteracy of the disease.

"If relief is not obtained so soon as expected, and the horse is costive, give a glyster, with

"Two quarts of common gruel; coarse sugar six ounces; Glauber salts four ounces; tincture of jalap two ounces; and a quarter of a pint of olive oil. This must be repeated every 24 hours, or oftener, if necessary.

"Should the symptoms still continue violent, without discovering any signs of abatement; after waiting a proper time for the effect of previous administrations, let the bleeding be repeated, in quantity proportioned to the urgency of symptoms, continuing the decoction and nitre every three or four hours, and repeating the glyster if plentiful evacuations have not been obtained by the former injection.

"The diluting drink, before prescribed, is introduced here in preference to a ball, that its medicinal efficacy may be expeditiously conveyed to the seat of disease. So soon as the wished-for advantages are observed, and the predominant and dangerous symptoms begin to subside, when he labours less in respiration, is brisker in appearance, heaves less in the flank, dungs frequently, stales freely, runs at the nose, eats his warm mashes of scalded bran, with four ounces of honey to each, and will drink thin gruel for his common drink (in each draught of which should be dissolved two ounces of cream of tartar); in short, so soon as every appearance of danger is dispelled, the management may be the same as in a common cold; giving one of the following balls every morning for a fortnight, leaving off the mashes and diluting drink by degrees, and varying the mode of treatment as circumstances may dictate.

"CASTILE soap, six ounces; gum ammoniacum, two ounces; anise and cummin seeds (in powder), each four ounces; honey sufficient to form the mass, which divide into a dozen balls.

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Pleurisy, Inflammation of the Lungs, &c.

* Gentleman's Stable Director, p. 215.

Pleurisy,
Inflamma-
tion of the
Lungs, &c.

"To prevent any ill effects that may arise from the bad condition of the matter that has so long overloaded the vessels of the lungs, such as the formation of ulcers, knots, or tubercles, the best method will be, so soon as the horse (with great care, gentle exercise, moderate and regular feeding) has recovered in a tolerable degree his natural strength, to put him upon the following gentle course of physic; and it will become more immediately necessary, where the horse bears about him remnants of the distemper, either in a gleet from the nose, rattling in his throat, difficulty of breathing, or heaving in the flanks.

"Socotorine aloe nine drams; rhubarb and jalap each a dram and a half; gum ammoniacum, calomel, and ginger, each a dram; oil of juniper sixty drops; syrup of buckthorn sufficient to make a ball.

"Six clear days or more, if the horse is weak, should be allowed between each dose."

There is also an external pleurisy, or inflammation of the muscles between the ribs, which, when not properly treated, proves the foundation of that disorder called the *chest-founder*; for if the inflammation is not dispersed in time, and the viscid blood and juices so attenuated by internal medicines that a free circulation is obtained, such a stiffness and inactivity will remain on these parts, as will not easily be removed, and which is generally known by the name of *chest-founder*.

The signs of this inflammation, or external pleurisy, are a stiffness of the body, shoulders, and fore-legs; attended sometimes with a short dry cough, and a shrinking when handled in those parts.

Bleeding, soft pectorals, attenuants, and gentle purges, are the internal remedies; and, externally, the parts affected may be bathed with equal parts of spirit of sal ammoniac and ointment of marshmallows or oil of camomile.

These outward inflammations frequently fall into the inside of the fore-leg, and sometimes near the shoulder; forming abscesses, which terminate the disorder.

SECT. X. Of a Cough, and Asthma.

THE consequences of colds neglected or injudiciously treated, are settled habitual coughs, asthmas, broken-wind, and consumption.

Of coughs two are chiefly distinguished. The one is loose, almost continual, and increasing to violence upon the least motion: the other is a short dry cough, preceded by a husky hollow kind of wheezing, as if respiration was obstructed by fragments of hay or corn retained in the passage. This last is the kind of cough called *asthma*, by most writers, and for which mercurial purges have been recommended. These, however, Mr Taplin observes, may perhaps be exhibited with more propriety after the administration of a course of the following balls, should they fail in the desired effect. Bleeding must be first performed, and occasionally repeated in small quantities, till the glandular inflammation and irritability are allayed, and the blood so attenuated by the constant use of nitre, as to render the circulation free through the finer vessels of the lungs, from the obstructions in which all the difficulties proceed. Bleeding having taken place with the

necessary circumspection as to quantity, let the two ounces of nitre be given punctually every night and morning in the water, as particularized under the article *Colds*, continuing one of the following balls every morning for a fortnight or three weeks, that a fair and decisive trial may be obtained.

Detergent Pectoral Ball.—TAKE of Castile soap, aniseed, and liquorice powders, each five ounces; Barbadoes tar, six ounces; gum ammoniacum, three ounces; balsam of Tolu, one ounce; honey (if required) to make a mass; which divide into a dozen balls.

If there should appear no abatement of the symptoms after the above trial, bleeding must be repeated, and mercurials had recourse to. Mr Taplin advises "two doses of mercurial physic to be given eight days apart, and prepared by the addition of a dram and a half of calomel to either of the purging balls (under the articles of purging) best calculated for the horse's strength and condition. After which repeat the above pectoral balls, with the addition of gum myrrh, Benjamin and Venice turpentine, each two ounces; dividing the mass into balls of two ounces each, repeating them every morning till the above proportion (with these additions) are totally consumed."

The other kind, or that long loud hollow cough which is almost incessant, and continually increasing upon the least hurry in exercise, proceeds equally from irritability and the action of the slimy mucus upon the glands in respiration, as well as the viscosity and sluggish motion of the blood through the finer passages; but yields to remedies with much less difficulty than the asthmatic. In this case, as in the other, bleeding must be premised, and followed by a mass compounded of equal parts of bran and oats, into which must be stirred and dissolved, while hot, honey four ounces. This mass must be repeated, with two ounces of nitre in the water, without intermission, every night and morning; giving also every morning the following ball, being an improvement by Mr Taplin upon the *cordial ball* of Braken.

TAKE Turkey figs, Spanish liquorice, aniseed, and liquorice powders, each four ounces; caraway seeds, elecampane, and anisated balsam, each two ounces; saffron, ginger (in powder), and oil of aniseed, each six drachms; honey sufficient to form the mass; and divide into twelve balls; of which let one be given every morning.

The figs and saffron are to be beat to a paste in the mortar previous to their incorporation with the other articles, the Spanish liquorice is to be softened over the fire by boiling in a small quantity of spring-water, and the whole of the ingredients mixed in a proper manner. "These balls (says our author) are powerfully cordial and restorative; they promote glandular excretion, warm and stimulate the stomach to the expulsion of wind, enliven the circulation, and invigorate the whole frame, as has been sufficiently ascertained by their instantaneous effect in the chase, where their excellence has been repeatedly established; but more particularly in deep swampy countries, when, after a severe burst, or a repetition of strong leaps, the horse has been so off his wind, or in fact, nature so exhausted, as not to be able to proceed a stroke farther; the immediate administration of a single ball has not only afforded instant

Cough and
Asthma.

Broken Wind. stant relief, but the horse gone through the day with his usual alacrity."

Before closing this section, it may be necessary to observe, that some young horses are subject to coughs on cutting their teeth; their eyes also are affected from the same cause. In these cases, always bleed; and if the cough is obstinate, repeat it, and give warm mashes; which, in general, are alone sufficient to remove this complaint.

SECT. XI. *Of a Broken Wind.*

THIS disorder, Mr Gibson is inclined to think, frequently originates from injudicious or hasty feeding of young horses for sale; by which means the growth of the lungs, and all the contents within the chest, are so increased, and in a few years so preternaturally enlarged, that the cavity of the chest is not capacious enough for them to expand themselves in and perform their functions.

A narrow contracted chest with large lungs may sometimes naturally be the cause of this disorder: and it has been observed, that horses rising eight years old are as liable to this distemper, as, at a certain period of life, men are to fall into asthma, consumptions, and chronic diseases.

The reason why it becomes more apparent at this age, may be, that a horse comes to his full strength and maturity at this time; at six, he commonly finishes his growth in height; after that time he lets down his belly and spreads, and all his parts are grown to their full extent; so that the pressure on the lungs and midriff is now more increased.

But how little weight soever these reasons may have, repeated dissections have given ocular proofs of a preternatural largeness, not only of the lungs of broken-winded horses, but of their heart and its bag, and of the membrane which divides the chest; as well as of a remarkable thinness in the diaphragm or midriff. This disproportion has been observed to be so great, that the heart and lungs have been almost of twice their natural size, perfectly sound, and without any ulceration whatever, or any defect in the wind-pipe or its glands. Hence it appears, that this enormous size of the lungs, and the space they occupy, by hindering the free action of the midriff, is the chief cause of this disorder: and as the substance of the lungs was found more fleshy than usual, they of course must lose a great deal of their spring and tone.

Whoever considers a broken-wind in this light, must own that it may be reckoned among the incurable distempers of horses; and that all the boasted pretensions to cure are vain and frivolous, since the utmost skill can amount to no more than now and then palliating the symptoms, and mitigating their violence.

We shall therefore only lay down such methods as may probably prevent this disorder, when pursued in time. But if they should not succeed, we shall offer some remedies and rules to mitigate its force, and make a horse as useful as possible under this malady.

It is usual, before a broken-wind appears, for a horse to have a dry obstinate cough, without any visible sickness or loss of appetite; but, on the contrary, a disposition to foul feeding, eating the litter, and drinking much water.

In order then to prevent, as much as possible, this

disorder, bleed him, and give him the mercurial physic above prescribed, which should be repeated two or three times.

The following balls are then to be taken for some time, which have been found extremely efficacious in removing obstinate coughs.

TAKE aurum mosaicum, finely powdered, eight ounces; myrrh and elecampane, powdered, each four ounces; aniseeds and bay-berries, each an ounce; saffron, half an ounce; make into balls with oxymel squills.

The aurum mosaicum is made of equal parts of quicksilver, tin, sal ammoniac, and sulphur. We give this medicine as strongly recommended by Mr Gibson; but how far the aurum mosaicum may contribute to its efficacy, may perhaps justly be disputed: as a substitute in its room, therefore, for this purpose, we recommend the same quantity of powdered squills, or gum ammoniacum, or equal parts of each.

Broken-winded horses should eat sparingly of hay, which as well as their corn may be wetted with chamber lye, or fair water; as this will make them less craving after water.

The volatile salts in the urine may make it preferable to water, and may be the reason why garlic is found so efficacious in these cases; two or three cloves given at a time in a feed, or three ounces of garlic bruised, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very serviceable; for by warming and stimulating the solids, and dissolving the tenacious juices which choke up the vessels of the lungs, these complaints are greatly relieved.

Careful feeding and moderate exercise has greatly relieved broken-winded horses.

Horses sent to graze in order to be cured of an obstinate cough, have often returned completely broken-winded, where the pasture has been rich and succulent, so that they have had their bellies constantly full. As the ill consequences therefore are obvious, where you have not the convenience of turning out your horse for a constancy, you may soil him for a month or two with young green barley, tares, or any other young herbage.

To pursue thick-winded horses, Barbadoes and common tar have often been given with success, to the quantity of two spoonfuls, mixed with the yolk of an egg, dissolved in warm ale, and given fasting two or three times a-week, especially those days you hunt or travel.

But in order to make all these sorts of horses of any real service to you, the grand point is to have a particular regard to their diet, observing a just economy both in that and their exercise; giving but a moderate quantity of hay, corn, or water, at a time, and moistening the former, to prevent their requiring too much of the latter, and never exercising them but with moderation, as has before been observed. The following alterative ball may be given once a fortnight or three weeks, and as it operates very gently, and requires no confinement but on those days it is given (when warm meat and water are necessary), it may be continued for two or three months.

TAKE socotorine aloes six drams; myrrh, galbanum, and ammoniacum, of each two drams; bay-berries

Broken Wind.

ries half an ounce: make into a ball with a spoonful of oil of amber, and a sufficient quantity of syrup of buckthorn.

Mr Taplin ridicules the idea of overgrown lungs, and suggests the following as grounds of a more rational opinion concerning the source of this disease.

"Whether horses who have been in the habit of full or foul feeding, with a very trifling portion of exercise, and without any internal cleansing from evacuations, compulsively obtained by purgatives or diuretics, may not constantly engender a quantity of viscid, tough, phlegmatic matter; which accumulating by slow degrees, may so clog and fill up some of that infinity of minute passages with which the lungs are known to abound, as probably to obstruct the air vessels in their necessary expansion for the office of respiration? And whether this very probable obstruction or partial suppression may not in sudden, hasty, and long continued exertions, rupture others, and by such local deficiency affect the elasticity of the whole? The probability, and indeed great appearance of this progress, has ever influenced me most forcibly to believe, that such obstructions once formed, the evil accumulates, till a multiplicity of the vessels become impervious, and render the lungs, by their constant accumulation and distention, too rigid for the great and necessary purpose of respiration."

That such a defect may sometimes occur, as a chest too narrow for lungs of an uncommon extension, that constitute naturally what are called *thick-winded horses*, our author does not deny: in which cases, it is agreed, there is no hope of a cure, nor scarcely of any alleviation. But he will by no means admit the above deformity to be a case of common occurrence, far less that it is the universal or even the most ordinary cause of broken wind.

"It cannot but be observed (says he) what an anxious desire a broken-winded horse always displays to obtain water; a self-evident conviction he is rendered uneasy by some glutinous adhesive internal substance, that instinct alone prompts the animal to expect drinking may wash away: on the contrary, if, as Bartlet and Gibson suppose, 'the lungs are too large for the chest,' every thing that increases the bulk of the abdomen or viscera (and consequently the pressure upon the diaphragm) must increase the disquietude, which is natural to believe from the sagacity of animals in other instances, they would in this most carefully avoid."

Mr Taplin therefore concludes, that if his hypothesis is founded in fact (which circumstances will not allow him the least reason to doubt), a cure may certainly be expected, provided the attempt is made upon the first appearance of the disease; though he does not hold out the probability where the original cause has been of long standing, and no attempts made to relieve.

In attempting the cure, the natural and obvious indications are, To promote the necessary evacuations in the first instance, to attenuate the viscosity of the glutinous obstructed matter, and to deterge the passages by a stimulation of the solids. Bleeding is therefore the first measure; and it ought to be repeated at proper intervals in moderate quantities, till divested of the coat of size and livid appearance that are certain signs of the lungs being obstructed either by viscosity or in-

flammation. After bleeding, the horse must go thro' a regular course of the mild purging balls prescribed after recovery from pleuresy. They are slightly impregnated with mercurial particles, and blended with the gums form a most excellent medicine for the purpose. In three days after the operation of the third dose, Mr Taplin directs to begin upon the following detergent balsamics, and continue to give one ball every morning, so long as may be thought necessary to form a fair opinion whether the advantage is gained or relief likely to be obtained.

TAKE of the best white soap eight ounces; gum guaiacum and ammoniacum, each three ounces; myrrh and Benjamin, aniseed and liquorice, each two ounces; balsam of Peru, Tolu, and oil of aniseed, each half an ounce; Barbadoes tar sufficient to make a mass, which divide into twenty balls.

It is necessary to be strictly observed, that during this course hay and water are to be dispensed with a very sparing hand, so as to prevent too great an accumulation in the stomach or intestines, that an observation may be made with the greatest certainty, whether any hopes of success from medicine may be justly entertained; if not, farther expence will be unadvisable, as it will appear, after such trial, an incurable malady at all events, and only susceptible of palliation.

SECT. XII. Of a Consumption.

WHEN a consumption proceeds from a defect in a horse's lungs or any principal bowel, the eyes look dull; the ears and feet are mostly hot; he coughs sharply by fits; sneezes much, and frequently groans with it; his flanks have a quick motion: he gleans often at the nose, and sometimes throws out a yellowish curdled matter; and he has little appetite to hay, but will eat corn, after which he generally grows hot.

As to the cure, one of the principal things is bleeding in small quantities (a pint, or pint and half, from some horses is sufficient), which should be repeated as often as the breath is more than ordinarily oppressed. Pectorals may be given to palliate present symptoms; but as dissections have discovered both the glands of the lungs and mesentery to be swelled, and often indurated, the whole stress lies on mercurial purges, and the following ponderous alteratives, given intermediately.

TAKE native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the same quantity of gum guaiacum and nitre; give the horse an ounce of this powder twice a-day, wetting his feeds.

The spring-grass is often extremely serviceable; but the salt marshes are to be preferred, and to be more depended on than medicines; for great alterations are thereby made in the blood and juices, and no small benefit arises from open air and proper exercise.

SECT. XIII. Of Apoplexy or Staggers, Lethargy, Epilepsy, and Palsy.

FARRIERS generally include all distempers of the head under two denominations, viz. *staggers* and *convulsions*, wherein they always suppose the head primarily affected. But in treating these disorders, we will distinguish

Apoplexy, distinguish between those that are peculiar to the head, as having their source originally thence; and those that are only concomitants of some other disease.

so strong, that he has not only beat and spurned his litter, but the pavement with it; and with these alternate symptoms a horse has continued more than three hours, and then has as surprisingly recovered: at the going off of the fit, he generally foams at the mouth, the foam being white and dry, like what comes from a healthful horse when he champs on the bit.

In an apoplexy a horse drops down suddenly, without other sense or motion than a working at his flanks.

The previous symptoms are, drowiness; watery eyes, somewhat full and inflamed; a disposition to reel; feebleness; a bad appetite; the head almost constantly hanging, or resting on the manger; sometimes with little or no fever, and scarce any alteration in the dung or urine; the horse is sometimes disposed to rear up, and apt to fall back when handled about the head; which is often the case with young horses, to which it does not suddenly prove mortal, but with proper help they may sometimes recover. If the apoplexy proceeds from wounds or blows on the head, or matter on the brain; besides the above symptoms, the horse will be frantic by fits, especially after his feeds, so as to start and fly at every thing. These cases seldom admit of a perfect recovery; and when horses fall down suddenly, and work violently at their flanks, without any ability to rise after a plentiful bleeding, they seldom recover.

But in all kinds of gripes, whether they proceed from disorders in the guts or retention of urine, a horse is often up and down, rolls and tumbles about; and when he goes to lie down, generally makes several motions with great seeming carefulness, which shows he has a sense of his pain; and if he lies stretched out for any time, it is generally but for a short space.

Epilepsies and convulsions may arise from blows on the head, too violent exercise, and hard straining; and from a fulness of blood, or impoverished blood, and surfeits; which are some of the causes that denote the original disorder.

In lethargic disorders, the horse generally rests his head with his mouth in the manger, and his pole often reclined to one side; he will show an inclination to eat, but generally falls asleep with his food in his mouth, and he frequently swallows it whole without chewing: emollient glysters are extremely necessary in this case, with the nervous balls recommended for the staggers and convulsions; strong purges are not requisite, nor must you bleed in too large quantities, unless the horse be young and lusty. In old horses, rowels and large evacuations are improper; but volatiles of all kinds are of use when they can be afforded: the alterative purge mentioned at the end of this section may be given and repeated on amendment.

This distemper is to be cured by these means, if the horse is not old and past his vigour. It is a good sign if he has a tolerable appetite, and drinks freely without flabbering, and if he lies down and rises up carefully, though it be but seldom.

But if a lethargic horse does not lie down; if he is altogether stupid and careless, and takes no notice of any thing that comes near him; if he dungs and stales seldom, and even while he sleeps and dozes, it is a bad sign: if he runs at the nose thick white matter, it may relieve him; but if a viscid gleet, that sticks to his nostrils like glue, turn to a profuse running of ropy, reddish, and greenish matter, it is an infallible sign of a great decay of nature, and that it will prove deadly.

Young horses from four to six years, are very subject to convulsions, from botts in the spring; and the large coach breed more than the saddle. They are seized without any previous notice; and if botts and worms are discovered in their dung, the cause seems to be out of doubt, more especially if they have lately come out of a dealer's hands.

When this convulsion proceeds from a distemperature of the midriff, or any of the principal bowels, it is to be distinguished from botts and vermin by previous symptoms; the horse falls off his stomach, and grows gradually weak, feeble, and dispirited, in his work, and turns short-breathed with the least exercise.

The lively description of that universal cramp or convulsion, called by some the *stag-evil* which seizes all the muscles of the body at once, and locks up the jaws, so that it is impossible almost to force them open, we shall give in Mr Gibson's own words, who says: As soon as the

All that can be done is to empty the vessels as speedily as possible, by striking the veins in several parts at once, bleeding to four or five quarts; and to raise up the horse's head and shoulders, supporting them with plenty of straw. If he survives the fit, cut several rowels: give him night and morning glysters prepared with a strong decoction of fenna and salt, or the purging glyster mentioned in the directions; blow once a day up his nostrils a dram of powder of asarabacca, which will promote a great discharge; afterwards two or three aloetic purges should be given; and to secure him from a relapse, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a month; or, which is preferable, the same quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fulness of blood, high feeding, and want of sufficient exercise, or a fizy blood (which is often the case with young horses, who though they reel, stagger, and sometimes suddenly fall down, yet are easily cured by the above method), an opening diet with scalded bran and barley will be necessary for some time; and the bleeding may be repeated in small quantities.

As to the other disorders of the head, such as lethargy or sleeping evil, epilepsy or falling-sickness, vertigo, frenzy, and madness, convulsions, and paralytical disorders, as they are most of them to be treated as the apoplexy and epilepsy, by bleeding and evacuations, with the alteratives there directed, we shall wave treating of them separately; but mention some particular rules to distinguish them, according to the plan we laid down; and then offer some general remedies for the several purposes.

In an epilepsy or falling sickness, the horse reels and staggers, his eyes are fixed in his head, he has no sense of what he is doing, he stales and dungs insensibly, he runs round and falls suddenly; sometimes he is immovable, with his legs stretched out as if he was dead, except only a quick motion of his heart and lungs, which causes a violent working of his flanks; sometimes he has involuntary motions, and shaking of his limbs.

Apoplexy,
Lethargy,
&c.

the horse is seized, his head is raised with his nose towards the rack, his ears pricked up, and his tail cocked, looking with eagerness as an hungry horse when hay is put down to him, or like a high-spirited horse when he is put upon his mettle; infomuch, that those who are strangers to such things, when they see a horse stand in this manner, will scarce believe any thing of consequence ails him; but they are soon convinced, when they see other symptoms come on apace, and that his neck grows stiff, cramped, and almost immoveable: and if a horse in this condition lives a few days, several knots will arise on the tendinous parts thereof, and all the muscles both before and behind will be so much pulled and cramped, and so stretched, that he looks as if he was nailed to the pavement, with his legs stiff, wide, and straddling; his skin is drawn so tight on all parts of the body, that it is almost impossible to move it; and if trial be made to make him walk, he is ready to fall at every step, unless he be carefully supported; his eyes are so fixed with the inaction of the muscles, as give him a deadness in his looks; he snorts and sneezes often, pants continually with shortness of breath; and this symptom increases continually till he drops down dead; which generally happens in a few days, unless some sudden and very effectual turn can be given to the disorder.

In all these cases the horse should first be bled plentifully, unless he is low in flesh, old, or lately come off any hard continued duty; then you must be more sparing of his blood; afterwards give the following ball:

TAKE afafetida half an ounce, Russia castor powdered two drams, valerian root powdered once ounce; make into a ball with honey and oil of amber.

This ball may be given twice a-day at first; and then once, washed down with a decoction of mistletoe or valerian sweetened with liquorice or honey: an ounce of afafetida may be tied up in a piece of strong coarse linen rag, and put behind his grinders to champ on.

The laxative purges and emollient glysters should be given immediately to keep the body open; but when the former balls have been taken a week or ten days, the following may be given once a-day with the valerian decoction.

TAKE cinnabar of antimony six drams; afafetida half an ounce; aristolochia, myrrh, and bay-berries, of each two drams; make into a ball with treacle and oil of amber.

This is the most effectual method of treating these disorders; but when they are suspected to arise from bots and worms, which is generally the case, mercurial medicines must lead the way, thus:

TAKE mercurius dulcis and philonium, of each half an ounce; make into a ball with conserves of roses, and give the horse immediately: half the quantity may be repeated in four or five days.

The following infusion should then be given, to the quantity of three or four horns, three or four times a-day, till the symptoms abate; when the above nervous balls may be continued till they are removed.

TAKE penny-royal and rue of each two large handfuls, camomile flowers one handful, afafetida and castor of each half an ounce, saffron and liquorice-root sliced of each two drams; infuse in two

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quarts of boiling-water; pour off from the ingredients as wanted.

If the castor is omitted, add an ounce of afafetida.

The following ointment may be rubbed into the cheeks, temples, neck, shoulders, spine of the back, and loins, and wherever there is the greatest contractions and stiffness.

TAKE nerve and marshmallow ointment of each four ounces, oil of amber two ounces, with a sufficient quantity of camphorate spirit of wine; make a liniment.

When the jaws are so locked up that medicines cannot be given by the mouth, it is more eligible to give them by way of glyster: for forcing open the jaws by violence often puts a horse into such agonies, that the symptoms are thereby increased.

In this case also he must be supported by nourishing glysters, made of milk-pottage, broths, &c. which must be given to the quantity of three or four quarts a-day: glysters of this kind will be retained, and absorbed into the blood; and there have been instances of horses thus supported for three weeks together, who must otherwise have perished.

Mr Gibbon mentions some extraordinary instances of success in cases of this sort by these methods, and repeated frictions, which are extremely serviceable in all convulsive disorders, and often prevent their being jaw-set; they should be applied with unwearied diligence every two or three hours, wherever any stiffness or contractions in the muscles appear; for a horse in this condition never lies down till they are in some measure removed.

The use of rowels in these cases is generally unsuccessful, the skin being so tense and tight, that they seldom digest kindly, and sometimes mortify: so that if they are applied, they should be put under the jaws, and in the breast.

The red-hot iron so frequently run through the fore-top and mane, near the occipital bone, for this purpose, has often been found to have destroyed the cervical ligament.

In paralytic disorders, where the use of a limb or limbs is taken away, the internals above recommended should be given; in order to warm, invigorate, and attenuate the blood; and the following stimulating embrocation should be rubbed into the parts affected.

TAKE oil of turpentine four ounces, nerve ointment and oil of boys of each two ounces, camphor rubbed fine one ounce, rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected should be well bathed for a considerable time, to make it penetrate; and when the hind parts chiefly are lame, the back and loins should be well rubbed with the same. To the nervous medicines above recommended may be added snake-root, contrayerva, mustard-seed, horse-radish root, steeped in strong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a-day alone, or two horns full may be taken after the nervous balls.

TAKE snake-root, contrayerva, and valerian, of each half an ounce; mustard-seed and horse-radish root scraped, of each two ounces; long pepper two drams: infuse in three pints of strong wine.

When

Strangles
and Vives.

Strangles.
and Vives.

When the horse is recovering from any of the above disorders, the following alterative purge may be repeated two or three times, as it operates very gently.

TAKE focotorine aloes one ounce, myrrh half an ounce, afafetida and gum ammoniacum of each two drams, saffron one dram; make into a ball with any syrup.

Where a retention of dung is the cause of this disorder, the great gut should first be raked thoroughly with a small hand, after which plenty of emollient oily glysters should be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their imprisoned dung. Their diet should for some days be opening, and consist chiefly of scalded bran, with flour of brimstone, scalded barley, &c.

SECT. XIV. *Of the Strangles, and Vives.*

1. THE Strangles is a distemper to which colts and young horses are very subject. The symptoms and progress of this disease are as follows: A dull heaviness and inactivity, loss of appetite, and a hollow husky cough, occasioned by the irritability of the inflamed glandular parts in the throat and about the root of the tongue. To excite a degree of moisture in the mouth that may allay this disagreeable sensation, the horse is often picking his hay, but eats little or none; a degree of symptomatic heat comes on, and a consequent clamminess and thirst is perceptible. As the distemper advances, he becomes proportionally languid and inattentive; a swelling (with sometimes two or three smaller surrounding it) is now discovered to have formed itself between the jaw-bones, which is at first very hard, exceeding painful, and visibly increasing; he now swallows with difficulty, heaves in the flanks, and his whole appearance gives signs of the greatest distress.

The first object for consideration is the state of the subject: if the evacuations are regular (as they generally are), and the feverish symptoms moderate, let the swelling be examined, and its suppuration promoted. For this purpose (first clipping away all the long or superfluous hairs that cover or surround the part), foment with small double flannels, dipt in a strong decoction of camomile, marsh-mallows, or rosemary, for ten minutes, as hot as can be conveniently submitted to; and then apply a poultice prepared as follows.

TAKE of coarse bread, barley meal, and camomile or elder flowers, each a handful; boil over the fire in a sufficient quantity of milk, or in the decoction for the fomentation; into which stir about a third (of the whole quantity) of white-lily root, washed clean and pounded to a paste; adding linseed and fenugreek (in powder) of each an ounce; stirring in, while hot, of turpentine two ounces, and of lard four, laying it on moderately warm, and bandaging firm. To serve for two poultices.

Both the fomentation and poultice must be repeated every night and morning till an opening in the swelling is effected, which generally happens in the course of five or six days. Upon the appearance of discharge, the aperture may be a little enlarged with a bistory or the point of any sharp instrument adequate to the purpose, though this will be unnecessary if the discharge is made freely and easily of itself. The

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part should then be dressed with the following ointment spread on tow, still continuing the poultice over it to promote the digestion, and prevent any remaining hardness.

TAKE rosin and Burgundy pitch of each a pound and a half, honey and common turpentine each eight ounces, yellow wax four ounces, hog's-lard one pound, verdigris finely powdered one ounce; melt the ingredients together, but do not put in the verdigris till removed from the fire; and it should be stirred in by degrees till the whole is grown stiff and cool.

If the fever and inflammation run high, and the swelling be so situated as to endanger suffocation, a moderate quantity of blood must be taken away.

In this disorder, mashes must be the constant food, in small proportions, to prevent waste: in each of which Mr Taplin directs to put of liquorice and aniseed powders half an ounce, and about two ounces of honey, or in lieu of this last a quart of malt: The drink, consisting of warm water impregnated with a portion of scalded bran or water-gruel, should be given in small quantities and often. The head must be kept well covered with flannel, as the warmth will greatly tend to assist in promoting the necessary discharge: tho', unless circumstances and weather forbid, the horse need not be confined, but should have the advantage of air and short gentle exercise. Nor should regular dressing, and the accustomed course of stable discipline, be omitted, but only used in a less degree than formerly when in health.

This distemper is seldom dangerous, unless from neglect, ignorant treatment, or cruel usage. It generally terminates with a running at the nose, in a greater or less degree; which should be frequently cleaned from the inside of the nostrils, by means of a sponge sufficiently moistened in warm water, to prevent its acquiring an adhesion to those parts, or a foulness and fetor that would shortly become acrimonious.

If a hardness remains after the sores are healed up, they may be anointed with the following mercurial ointment.

TAKE of crude mercury or quicksilver one ounce, Venice turpentine half an ounce; rub together in a mortar till the globules of the quicksilver are no longer visible; then add, by little and little, two ounces of hog's-lard, just warm and liquefied; and let the whole be kept close covered for use. When the horse has recovered his strength, purging will be necessary.

If a copious and offensive discharge from the nostrils should continue after the abscess is healed up, there will be reason to suspect the disease called *glanders*, treated of in a subsequent section.

2. The Vives or Ives differ from the strangles only in this; that the swellings of the kernels seldom gather or come to matter, but by degrees perspire off and disperse by means of warm cloathing, anointing with the marshmallow ointment, a moderate bleeding, and a dose or two of physic. But should the inflammation continue notwithstanding those means, a suppuration must be promoted by the methods recommended in the strangles.

When these swellings appear in an old or full-aged horse, they are signs of great malignity, and often of

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an inward decay, as well as forerunners of the glanders.

SECT. XV. *Of the Diseases of the Eyes.*

1. THE cases that most frequently occur, requiring medical aid, or admitting of cure, are generally the effects either of cold, or of blows, bites, or other external injuries. In those proceeding immediately from cold, there is perceived an inflammation upon the globe of the eye, and internal surrounding parts, as the edges of the eyelids, &c. Instead of its former transparency, the eye has a thick cloudy appearance upon its outer covering, and is constantly discharging an acrid serum, which in a short time almost excoriates the parts in its passage. The horse drops his ears, becomes dull and sluggish, is frequently shaking his head as if to shake off the ears, and in every action discovers pain and disquietude. In this case, after bleeding, the treatment prescribed in the Section of *Colds* must be adopted and persevered in; and to cool the parts, and allay the irritation occasioned by the scalding serum, let the eyes and surrounding parts be gently washed twice or thrice every day with a sponge or tow impregnated with the following solution:

SUGAR of lead one dram, white vitriol two scruples, spring water half a pint, brandy or camphorated spirits one ounce or two table-spoonfuls.

If the inflammation should not seem likely to abate, but to wear a threatening appearance, the following diuretic medicine must be administered.

CASTILE soap twelve ounces, yellow rosin and nitre (in powder) each eight ounces, powdered camphire one ounce, and oil of juniper six drams; mixed with a sufficient quantity of syrup or honey. The mass is to be divided into 12 balls, rolled up in liquorice or aniseed powder; one of which is to be given every morning, using also gentle work or moderate exercise.

2. The effects arising from blows or bites form different appearances, according to the severity of the injury sustained. Should inflammation and swelling proceed from either cause, bleeding will be necessary without delay, and may be repeated at proper intervals till the symptoms appear to abate; and let the parts be plentifully embrocated four times a-day with the following preparation of Goulard's cerate.

EXTRACT of Saturn three drams; camphorated spirits one ounce; river or pond water one pint. The extract to be first mixed with the spirits, and then the water to be added.

If a large swelling, laceration, or wound, attends; after washing with the above, apply a warm poultice of bread, milk, and a little of the lotion, softened with a small portion of hog's lard or olive oil. In cases of less danger, or in remote situations where medicines are not easily procured, the following may be used as a substitute.

BEST white-wine vinegar half a pint, spring water a quarter of a pint, and best brandy a wine glass or half a gill.

3. As to the gutta serena, cataract, film, &c. these are cases in which relief is very seldom obtained.

The gutta serena is a partial or universal loss of sight, where no palpable defect or fault appears in the eye, except that the pupil is a little more enlarged or con-

tracted. The appearances of this blemish are various, as well as the causes and effects, some of its subjects being totally blind, and others barely enabled to distinguish between light and darkness. The signs are a blackness of the pupil, an alteration of the size of the eye, and its not contracting or dilating upon a sudden exposure to any degree of light. In order to the cure, it is necessary to attend to the cause, and to apply such remedies as that may indicate: though in truth it is a disorder in which, from whatever cause originating, no great expectation can be formed from medicine either internally or externally; more particularly from the former, the seat of disease being so far out of the reach of medicinal action. If the defect should be owing to a contraction of or compression upon the optic nerve, very little can be done with any expectation of success; and much less if it arises from a palsy of that or any neighbouring part.

A cataract is a defect in the crystalline humour of the eye, which, becoming opaque, prevents the admission of those rays upon the retina that constitute vision. The disorder called *moon eyes*, are only cataracts forming. These generally make their appearance when a horse is turned five coming six; at which time one eye becomes clouded, the eye-lids being swelled, and very often shut up; and a thin water generally runs from the diseased eye down the cheek, so sharp as sometimes to excoriate the skin; the veins of the temple, under the eye, and along the nose, are turgid and full: though sometimes it happens that the eye runs but little. This disorder comes and goes till the cataract is ripe; then all pain and running disappears, and the horse becomes totally blind, which is generally in about two years. During this time some horses have more frequent returns than others; which continue in some a week or more, in others three or four; returning once in two or three months, and they are seldom so long as five without a relapse. There is another kind of *moon-blindness* which is also the forerunner of cataracts, where no humour or weeping attends. The eye is never shut up or closed here, but will now and then look thick and troubled, at which time the horse sees nothing distinctly: when the eyes appear sunk and perishing, the cataracts are longer of coming to maturity; and it is not unusual in this case for one eye to escape. These cases generally end in blindness of one if not of both eyes. The most promising signs of recovery are when the attacks come more seldom, and their continuance grows shorter, and that they leave the cornea clear and transparent, and the globe plump and full.

In all blemishes or defects, where a thickening of some one of the coats, membranes, or humours of the eye, has formed an appearance of cataract or film, it has been an established custom among most farriers to bestow a plentiful application of corrosive powders, unguents, and solutions, for the purposes of obliteration; without reflecting (as Mr Taplin observes) upon the absurdity of endeavouring to destroy by corrosion, what is absolutely separated from the surface by a variety of membranous coverings, according to the distinct seat of disease; with which it is impossible to bring the intended remedy into contact, without first destroying the intervening or surrounding parts by which the inner delicate structure is so numerously guarded. But in all disorders of this sort, whether moon-eyes or con-

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Glanders. firmed cataracts with a weeping, general evacuations with internal alteratives can only take place. Indeed the attempts to cure cataracts have hitherto generally produced only a palliation of the symptoms, and sometimes have proved entirely destructive. Yet early care, it is said, has in some instances proved successful. To this end rowelling is prescribed, with bleeding at proper intervals, except where the eyes appear sunk and perishing. It is also directed, during the violence of the symptoms, to observe a cooling treatment; giving the horse two ounces of nitre every day mixed into a ball with honey; and bathing the parts above the eye with verjuice or vinegar wherein rose-leaves are infused, to four ounces of which half a drachm of sugar of lead may be added. The swelling on the lid may afterwards be bathed with a sponge dipt in equal parts of lime and Hungary water mixed together; and the following cooling physic should be given every fourth day, till the eye becomes clear.

LENITIVE electuary and cream of tartar of each four ounces, Glauber's salts three ounces, syrup of buckthorn two ounces.

When the weeping is by these means removed, the alterative powders (see the Section *Of Alterative Medicines*) should be given every day, till two or three pounds are taken, and after an interval of three months the same course should be repeated. This method, it is affirmed, has often been attended with good success, where the eyes have been full and no way perished.

4. The haws is a swelling and sponginess that grows in the inner corner of the eye, so large sometimes as to cover a part of the eye. The operation here is easily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dressed with honey of roses; and if a fungus or spongy flesh arises, it should be sprinkled with burnt alum, or touched blue with vitriol.

SECT. XVI. *Of the Glanders.*

M. DE LA FOSSE has distinguished seven different kinds of glanders, four of which are incurable.

The first proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is discharged through the nostrils, like a whitish liquor, sometimes appearing in the lumps and grumes: in this disorder, though the matter is discharged from the nostrils, yet the malady is solely in the lungs.

The second is a wasting humour, which usually seizes horses at the decline of a disease, caused by too hard labour; this defluxion also proceeds from the lungs.

The third is a malignant discharge, which attends the strangles sometimes, and falls upon the lungs, which runs off by the nostrils.

The fourth is, when an acrimonious humour in the farcy seizes these parts, where it soon makes terrible havock.

The fifth kind we shall describe by and by, as arising from taking cold.

The sixth kind is a discharge from the strangles, which sometimes vents itself at the nostrils.

In the seventh sort, which he calls the *real glanders*, the discharge is either white, yellow, or greenish, sometimes streaked or tinged with blood: when the disease is of long standing, and the bones are fouled, the matter turns blackish, and becomes very fetid; and is

always attended with a swelling of the kernels or glands under the jaws; in every other respect the horse is generally healthy and sound, till the distemper has been of some continuance.

It is always a bad sign when the matter sticks to the inside of the nostrils like glue or stiff paste; when the inside of the nose is raw, and looks of a livid or lead colour; when the matter becomes bloody, and stinks; and when it looks of an ash-colour. But when only a limpid fluid is first discharged, and afterwards a whitish matter, the gland under the jaw not increasing, and the disorder of no long continuance, we may expect a speedy cure; for in this case, which arises from taking cold after a horse has been overheated, the pituitary membrane is but slightly inflamed, the lymph in the small vessels condensed, and the glands overloaded, but not yet ulcerated.

Our author affirms this disease to be altogether local; and that the true seat of it is in the pituitary membrane which lines the partition along the inside of the nose, the maxillary sinuses or cavities of the cheek-bones on each side the nose, and the frontal sinuses or cavities above the orbits of the eyes: that the viscera, as liver, lungs, &c. of glandered horses, are in general exceeding sound; and consequently that the seat of this disorder is not in those parts, as has been asserted by most authors. But on nicely examining by dissection the heads of such horses, he found the cavities above mentioned more or less filled with a viscous slimy matter; and the membrane which lines both them and the nostrils inflamed, thickened, and corroded with fordid ulcers, which in some cases had eat into the bones.

It is a curious remark of our author, that the sublingual glands, or the kernels situated under the jaw-bone, which are always swelled in this distemper, do not discharge their lymph into the mouth, as in man, but into the nostrils; and that he constantly found their obstruction agreed with the discharge: if one gland only was affected, then the horse discharged from one nostril only; but if both were, then the discharge was from both.

The seat of this disorder thus discovered, the mode of cure he had recourse to was by trepanning these cavities, and taking out a piece of bone, by which means the parts affected may be washed with a proper injection, and in fine the ulcers deterged, healed, and dried up; and his success, by his own account, was very great.

But as, from the observations since made by this gentleman, there are different species of the glanders; so the cure of the milder kinds may first be attempted by injections and fumigations. "Thus, after taking cold, should a horse for 15 or 20 days discharge a limpid fluid or whitish matter from one or both nostrils, the glands under the jaw rather growing harder than diminishing, we may expect it will degenerate into a true glanders. To prevent which, after first bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of lintseed, marshmallows, elder, camomile flowers, and honey of roses, or such like, be thrown up as far as possible with a strong syringe, and repeated three times a-day: should the running not lessen or be removed in a fortnight by the use of this injection, a restraining one may now be

Glanders.

prepared with tincture of roses, lime-water, &c. and the nostrils fumigated with the powders of frankincense, mastich, amber, and cinnabar, burnt on an iron heated for that purpose; the fume of which may easily be conveyed through a tube into the nostrils." Such is the method recommended by Bartlet, which he says has been found successful when used in time. But a more particular course of procedure will be afterwards described, that the reader may have the fullest information concerning this most difficult disease.

When the disorder is inveterate, recourse must be had to the operation above described, according to the doctrine of M. la Fosse.

The pretensions of that gentleman, however, have been lately exposed with seeming justice by Mr Taplin; and the following circumstances quoted from the French farrier's work seem sufficient of themselves to throw suspicion upon the whole. We are told of three horses he trepanned, each in two places: the internal parts were constantly syringed, and they were perfectly recovered; "the wound and perforation filling up in 26 days, the horses suffering no inconvenience from the operation, though after this experiment they were PUT TO DEATH." We are at last confidently assured, that such operations being performed, "after opening the cavities, should it by probing be discovered that the bones are carious (or, in other words, rotten), the best way then will be to dispatch the horse, to save unnecessary trouble and expence." Which Mr Taplin interprets in plain English thus: "Deprive the horse of half his head, in compliment to the pecuniary feelings of the farrier; and if you find the remaining half will not answer the purpose of the whole, cut his throat, or shoot him through the head, to save the operator's credit."

Mr Taplin also condemns the distinction of the disorder into different species; and the various symptoms that appear, he considers as only marking different stages of the same disease. The fact according to him appears to be, "that any corrosive matter discharged from the nostrils, and suffered to continue for a length of time, so as to constitute ulcerations and corrode the bones, will inevitably degenerate into and constitute the disease generally understood by the appellation of glanders; every stagnant, acrimonious, or putrid matter, is possessed of this property, and more particularly when lodged (or by sinuses confined) upon any particular part. Divested of professional trick, chicanery, and deception, this is the incontrovertible explanation, whether proceeding from an ulceration of the lungs, or the inveterate glandular discharges from the head (where the case is of long standing, and the bone carious) they are equally incurable." In this view, therefore, prevention, rather than cure, being the rational object of attention, it remains only to point out such methods as seem likely to obviate the disorder upon the slightest appearance of its approach, or upon the attack of any other disease that may be likely to terminate in it.

Where the lungs, then, are the seat of disease, as in the first attack of coughs, &c. no better treatment can be pursued than that laid down under the Sections of *Colds* and *Coughs*. But where a swelling shows that matter is forming under the ears, jaws, or about the

root of the tongue, let every possible method be taken to produce a suppuration and discharge of matter; for, in most cases, an external evacuation becomes the crisis, and is greatly preferable to the chance of mischiefs that may be produced by the morbid matter being absorbed into the system.

Should cough, difficulty of breathing, or a great degree of inflammatory heat, attend, draw blood from a remote vein in moderate quantity, to mitigate either of those symptoms; and when the swellings about the parts have acquired an evident prominence, foment them twice a day, for two or three days, with flannels dipped in the following decoction:

CAMOMILE, wormwood, marshmallows, and elder flowers, of each a large handful, boiled in three quarts of water for a quarter of an hour, and then strained off. Let the liquor be used hot, and apply the herbs warm by way of poultice to the parts.

In two or three days a judgment may be formed whether a suppuration is likely to take place. If so, the tumors will increase in size, and feel soft and yielding in the middle when pressed; in which case apply the poultice, and proceed as directed above for the Strangles. If, on the contrary, the swellings continue hard and immovable, a running coming on at the nose; observe whether the matter is of a white colour and without smell; or is of different tinges, and streaked with blood. The former is a favourable sign; and in that case the treatment may be as directed under the Sections of *Cold* and *Cough*. But if the matter should prove of the latter description, every precaution ought to be instantly used, to prevent in its infancy what would soon become a case of much trouble. In the first place, therefore, in order to soften the viscid matter in the passages, and relax the inflammatory stricture of the glands, prepare a vapour bath of rosemary, lavender flowers, southernwood and marjoram (each a handful), boiled in two or three quarts of water. Put this into a pail, and let the horse's head be fixed over it as near as can be borne, and so long as the fumes passing up the nostrils can be supposed to take effect as an internal fomentation. This operation should be repeated twice every day; and much of the treatment recommended under coughs and strangles with glandular discharges from the nostrils, will at the same time appear proper to be observed, as being applicable to many of the present symptoms. Let it be particularly remembered, that, during the whole course of management, the head of the horse is to be kept as warm as possible, and in proportion much more so than the body, either in a double kersey hood, or a single external, and a flannel one underneath; as nothing can contribute more to a solution of the humours and promotion of their discharge, than a critical relaxation of the pores, particularly upon the very seat of disease.

In case the discharge should continue to increase in quantity and virulence, becoming still more discoloured, and its smell very offensive; besides continuing the fumigation, let half a gill of the following injection (milk warm) be thrown up either nostril (or both if the matter should be so discharged) with a strong forcible syringe, three or four times a-day.

LINSEED,

Glanders.

landers.

LINSEED, an ounce; camomile and elder flowers, each half an ounce; water, three pints. Boil for a few minutes; then strain off, and add to the liquor four ounces of *mel Egyptianum*, mixing well together at each time of using.

If the matter should notwithstanding grow so malignant as to threaten a corrosion and rottenness of the bones; besides a diligent use of both fumigation and injection, a course of mercurial unction must be immediately entered upon. Mr Taplin directs to "Let two, or at most three drams of the strong mercurial ointment (prepared as directed under *Strangles*) be very well rubbed into the glandular tumors, under the throat or ears, every night for a fortnight; first taking away with the scissars all superfluous or long hairs, that the mercurial particles may be with more certainty absorbed by the vessels, and taken into the circulation. If the owner of a horse labouring under this difficulty wishes, like a drowning man, to avail himself of another twig, he may call in the aid of mercurial physic, or alterative medicines."

Upon the whole of this subject: As long as the attack continues in its early and simple state, let unremitting attention be paid to the treatment recommended under the different heads of those symptoms that are then most predominant: but should that treatment, after a fair trial, prove insufficient to resist the progress of the disease, the glands under the jaw-bone "continuing during the whole course inflexible, the matter first tinged with blood, then becoming deep in colour and most offensive in smell, the carcase emaciated, and the whole frame sinking under universal depression, the first loss (says Mr Taplin) will be ultimately best, in a resignation of his hide to the collar-maker, and his remains to the hounds. As to the operation of trepanning, so plausibly held forth with all its specious advantages, I shall openly and fairly enter my protest against it. For what does the whole amount to more than this?—If the horse should absolutely recover, and (what is still more unlikely) become adequate to the very purposes he was destined to before the attack; when the long illness, support, attendance, and farrier's bill, are balanced against his value, he must be a most excellent horse, and very much above the line of mediocrity, to have the credit-account in his favour. In fact, the most probable conjecture is, his inevitable dissolution: but should he miraculously escape from both the distemper and operator, ranking under the denomination of a *cured horse*, he may, perhaps, be then qualified to linger out a wretched existence in some park or pasture, but never enabled to encounter labour or fatigue."

SECT. XVII. *Of the Colic or Gripes, and Pains in the Bowels, from sudden Accidents.*

THERE seems to be no distemper so little understood by the common farrier as the colic or gripes in horses, one general remedy or method serving them in all cases: but as this disorder may be produced by very different causes, the method of cure must also vary; otherwife the intended remedy, injudiciously applied, will not only aggravate the complaint, but make it fatal. We shall divide this disorder into three different species: the flatulent or windy, the bilious or inflam-

matory, and the dry gripes; each of which we shall distinguish by their different symptoms, and then point out the proper remedies.

1. The flatulent or windy colic may in general be readily distinguished by the rumbling of the confined air through the intestines: The horse is often lying down, and as suddenly rising again with a spring; he strikes his belly with his hinder feet, stamps with his fore-feet; and refuses his meat; when the gripes are violent, he will have convulsive twitches, his eyes be turned up and his limbs stretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuse sweats, and then into cold damps; strives often to stale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this last symptom proceeds from a stoppage of urine, that almost always attends this sort of colic, which may be increased by a load of dung pressing on the neck of the bladder.

These are the general symptoms of colic and gripes from wind, drinking cold water when hot, and when the perspirable matter is retained, or thrown on the bowels by catching cold; in all which cases they are violently distended. Cribbing horses are more particularly subject to this complaint, by reason they are constantly sucking in great quantities of air.

The first intention is to empty the strait gut with a small hand dipped in oil, which frequently makes way for the confined wind to discharge itself; and by easing the neck of the bladder, the suppression of urine is taken off, and the horse stales and gets ease.

The following ball and glyster seldom fail of giving relief in these cases.

TAKE Strasburgh or Venice turpentine, and juniper-berries pounded, of each half an ounce; salt-prunella or saltpetre, an ounce; oil of juniper, one dram; salt of tartar, two drams: Make into a ball with any syrup; it may be given whole, and washed down with a decoction of juniper-berries, or a horn or two of ale.

If the horse does not break wind, or stale plentifully, he will find no relief: therefore in an hour or two give him another ball, and add to it a dram of salt of amber; which may be repeated a third time, if found necessary. During the fit the horse may be walked and trotted gently; but should by no means be harassed beyond his ability, or dragged about till he is jaded.

The following glyster may be given, between the balls, or alone, and repeated occasionally.

TAKE camomile flowers two handfuls; anise, coriander, and fennel seeds, of each an ounce; long pepper half an ounce; boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of camomile eight ounces.

The signs of a horse's recovery, are his lying quiet, without starting or tumbling, and his gathering up his legs, and ceasing to lash out; and if he continues an hour in this quiet posture, you may conclude all danger over.

2. The next species of colic is the bilious or inflammatory. This, besides most of the preceding symptoms, is attended with a fever, great heat, panting, and dryness of the mouth: the horse also generally

Colic or Gripes, &c.

Taplin's
able Di-
story, p.
66.

id, p. 305.

Colic or
Gripes, &c.

rally throws out a little loose dung, with a hot scalding water; which, when it appears blackish, or of a reddish colour, and fetid smell, denotes an approaching mortification.

In this case the horse should immediately be bled to the quantity of three quarts; and it should be repeated, if the symptoms do not abate in a few hours. The emollient glyster, with two ounces of nitre dissolved in it, should be thrown up twice a day, to cool the inflamed bowels; plenty of gum-arabic water should be taken; and a pint of the following drink given every two or three hours till several loose stools are procured, and then it should be given only night and morning till the disorder is removed.

TAKE fenna three ounces, salt of tartar half an ounce; infuse in a quart of boiling water an hour or two; then strain off, and add two ounces of lenitive electuary, and four of Glauber's salts.

If this disorder is not removed by these means, but the inflammation and fever increase, attended with a discharge of the flesh-coloured water above described, the event will most probably be fatal; and the chief thing to be depended on now, must be a strong decoction of Jesuit's bark, given to the quantity of a pint every three hours, with a gill of red port-wine.

A quart of the same may be used for a glyster, with two ounces of Venice turpentine, dissolved with the yolks of two eggs, an ounce of diascordium, and a pint of red wine, and given twice a-day: if the horse recovers, give two or three mild rhubarb purges.

3. The dry gripes, or colic which arises often from costiveness, is discovered by the horse's frequent and fruitless motion to dung, the blackness and hardness of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great restlessness and uneasiness.

In this case the strait gut should be examined and emptied with a small hand oiled properly for that purpose; the emollient oily glyster (p. 116. col. 2. par 3.) should be thrown up twice a day; and the above purging drink given, till the bowels are unloaded, and the symptoms removed.

The diet for a horse in the gripes should be scalded bran, warm water-gruel, or white water, made by dissolving four ounces of gum-arabic in a quart of water, and mixing it with his other water.

4. From this history and division of gripes and colics, with their different treatment, it appears how absolutely necessary it is they should be well understood, in order to be managed skilfully: it is plain, too, that violent hot medicines should in every species of this disorder be guarded against, and given with great caution and discretion, even in the first kind of flatulent colic, where indeed they can only be wanted; yet too often, when prepared by the farriers with oil of turpentine, geneva, pepper, and brine, &c. they even increase that disorder, by stimulating the neck of the bladder, too forcibly heating the blood, and inflaming the bowels, till a mortification is brought on them. These are, in general, the constant appearances of horses that die of this disorder; whose bowels being examined for that purpose, have been found inflamed, full of red and livid spots, sometimes quite black, crisped with extreme heat, and rotten.

SECT. XVIII. Of the Lax and Scouring, with other Disorders of the Stomach and Bowels.

Lax and
Scouring
&c.

It is sometimes a nice matter to form a proper judgment when to controul or encourage a looseness; but these general rules may be a direction: If a healthy full horse, on taking cold, or upon hard riding, overfeeding, eating unwholesome food, or with a slight fever, should have a moderate purging, by no means think of stopping it; but rather encourage it with an open diet, and plenty of warm gruel: but if it continues long, with gripings, the mucus of the bowels coming away, and the horse losing his appetite and flesh, recourse must be had to proper medicines. If he voids great quantities of slime and greasy matter, give him the following drench, and repeat it every other day for three times.

TAKE lenitive electuary and cream of tartar of each four ounces, yellow rosin finely powdered one ounce, and four ounces of sweet oil; mix with a pint of water-gruel.

The following alterative ball alone has been found successful for this purpose when given twice a-week, with scalded bran and warm gruel.

TAKE focotorine aloes half an ounce, diapente one ounce; make into a ball with the juice of Spanish liquorice dissolved in water, and a spoonful of oil of amber. To this may be added two drams of myrrh, and a dram of saffron, and (where it can be afforded) half an ounce of rhubarb.

When the purging is attended with a fever, rhubarb should first be given to the quantity of half an ounce, with an ounce and half of lenitive electuary; at night, after the working, give half an ounce or more of diascordium in a pint of red wine mulled with cinnamon; and repeat it every day, and the rhubarb-ball once in two or three.

But if the distemper increases, the horse's flanks and belly look full and distended, and he appears griped and in pain, let this glyster be given, and the quantity of diascordium increased an ounce in his night-drink.

TAKE camomile flowers one handful, red roses half a handful, pomegranate and balauftines of each an ounce; boil in two quarts of water to one; strain off, and dissolve it in two or three ounces of diascordium and one of mithridate; to which may be added a pint of port wine. Repeat it once a-day.

If the flux continues violent, give an ounce of rock-alum, with an ounce and a half of bole, twice a-day; or, dissolve double this quantity with two ounces of diascordium, and the cordial ball, in two quarts of hartshorn drink; to which may be added a pint of port; and give the horse, three or four times a-day, a pint of this drink. For this purpose also a strong decoction of oak-bark may be given, with either of the above remedies, and to the same quantity; even by itself, it will be found on trial no inconsiderable remedy.

When the discharge is attended with an acrid mucus or slime, the griping and pains are very severe, the common lining of the bowels being washed away; in this

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&c.

in this case the following glyster should frequently be injected warm.

TAKE of tripe-liquor or thin starch two quarts, oil of olives half a pint, the yolk of six eggs well broke, and two or three ounces of coarse sugar.

Some horses, having naturally weak stomachs and bowels, throw out their aliment undigested; their dung is habitually soft and of a pale colour; they feed poorly, and get no flesh: to remedy this complaint, give the following purge two or three times; and then the infusion to the quantity of a pint every morning.

TAKE socotorine aloes six drams, rhubarb powdered three drams, myrrh and saffron each a dram; make into a ball with syrup of ginger.

Infusion.—TAKE zedoary, gentian, winter's-bark, and orange-peel, of each two ounces; pomegranate-bark and balaustines of each an ounce; camomile-flowers and centaury, each a handful; cinnamon and cloves, each an ounce: infuse in a gallon of port or strong beer.

The bloody-flux is a distemper horses are not very subject to; however, as it sometimes does occur, whenever blood is discharged, attended with gripings and great pain in the bowels, if the flux is not speedily restrained the horse probably may be soon lost: we recommend therefore the following glyster and drink for that purpose.

TAKE oak-bark four ounces, tormentil-root two ounces, burnt hartshorn three ounces; boil in three quarts of forge-water to two; strain off, and add two ounces of diascordium, four ounces of starch, and half a dram of opium.

A glyster may also be prepared with the same quantity of fat broth, starch, and opium, in order to plaster over the coats of the bowels, and abate their violent irritations. Also,

TAKE soft chalk two ounces, mithridate or diascordium one ounce, powder of Indian-root half a dram, liquid laudanum 50 or 60 drops; dissolve in a pint of hartshorn drink, and add to it four ounces of cinnamon-water and red wine; give it twice a-day.

Gum-arabic dissolved in hartshorn drink, or in common water, should be the horse's usual drink.

When horses are apt to be costive, from whatever cause it arises, gentle openers should be given; such as cream of tartar, Glauber's salts, and lenitive electuary: four ounces of any two of these dissolved in warm ale, whey, or water, given every other morning for two or three times, will answer this purpose; especially if assisted by an oily emollient glyster, prepared with a handful of salt. Scalded bran or barley, with an ounce of fenugreek and linseed, occasionally given, will prevent this complaint: but where it is constitutional, and proceeds from the power and force of digestion in the stomach and guts, as sometimes happens, and the horse is in perfect health, no inconvenience will arise from it; and it is observed that such horses are able to endure great fatigue and labour.

SECT. XIX. Of Worms and Botts.

AUTHORS have described three different sorts of worms that affect horses, viz. *Botts*, which young horses are often troubled with in the spring; the *Rotundi*,

or those resembling earth-worms; and the *Ascarides*, or those about the size of the largest sewing needle, with flat heads.

The botts which breed in the stomachs of horses, and are sometimes the cause of convulsions, appear to be very large maggots, composed of circular rings, with little sharp prickly feet along the sides of their bellies (like the feet of hog-lice), which by their sharpness (like the points of the finest needles) seem to be of use to fasten them to the part where they breed and draw their nourishment, and to prevent their being loosened from such adhesion before they come to maturity. The eggs from whence those botts are produced, are dispersed into clusters all round the lower orifice of the stomach, and are laid under the inner coat or thin membrane of the stomach; so that when the animals come to form and life, they burst through this inner coat with their breech and tail straight outwards, and their trunks so fixed into the muscular or fleshy coat of the stomach, that it sometimes requires a good pull to disengage them; from the blood of this last coat they draw their nourishment, which they suck like so many leeches, every one ulcerating and purging up the part where it fixes like a honey-comb; and they often make such quick havock as to destroy the horse.

The symptoms of worms are various. The botts that many horses are troubled with in the beginning of the summer, are always seen sticking on the strait gut, and are often thrust out with the dung, with a yellowish coloured matter like melted sulphur: they are no ways dangerous there; but are apt to make a horse restless and uneasy, and rub his breech against the posts. The season of their coming is usually in the months of May and June; after which they are seldom to be seen, and rarely continue in any one horse above a fortnight or three weeks. Those that take their lodgment in the stomach, are extremely dangerous by causing convulsions; and are seldom discovered by any previous signs before they come to life, when they throw a horse into violent agonies. The other kinds are more troublesome than dangerous; but are known by the following signs: the horse looks lean and jaded, his hair stares as if he was surfeited; and nothing he eats makes him thrive; he often strikes his hind-feet against his belly; is sometimes griped, but without the violent symptoms that attend a colic and strangury; for he never rolls and tumbles, but only shows uneasiness, and generally lays himself down quietly on his belly for a little while, and then gets up and falls a feeding; but the surest sign is when he voids them with his dung.

For the cure of botts in the stomach, calomel should first be given in large quantities, and repeated at proper intervals; Æthiop's mineral, or some of the under-mentioned forms, may be given afterwards.

But botts in the strait gut may be cured by giving the horse a spoonful of favin, cut very small, once or twice a-day in his oats or bran, moistened; and three or four cloves of garlic may be added to advantage. Give also an aloetic purge between whiles; the following stands recommended.

TAKE fine socotorine aloes, ten drams; fresh jalap, one dram; aristolochia, or birthwort, and myrrh powdered, of each two drams; oil of favin and amber,

Worms
and Botts.

amber, of each one dram; syrup of buckthorn enough to form into a ball.

But as the source of worms in general proceeds from a vitiated appetite and a weak digestion, recourse must first be had to mercurials, and afterwards to such things as are proper to strengthen the stomach, promote digestion, and by destroying the supposed ova, prevent the regeneration of these animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conserve of wormwood, overnight; and the next morning the above purge: these may be repeated six or eight days. Or the following mercurial purge may be given, which will be less troublesome, and no less efficacious.

TAKE crude quicksilver two drams, Venice turpentine half an ounce; rub the quicksilver till no glistening appears; then add an ounce of aloes, a dram of grated ginger, 30 drops of oil of fennel, and a sufficient quantity of syrup of buckthorn to make a ball.

One of these balls may be given every six days, with the usual precautions in regard to mercurial physic; and the following powder intermediately.

TAKE powdered tin and Æthiop's mineral of each half an ounce: give every night in a mash, or among his corn.

The various preparations of antimony and mercury must be given several weeks together, in order to get entire riddance of these vermin. The Æthiop's mineral may be given to the quantity of half an ounce a-day; the mercurius alkalifatus to two drams a-day, incorporated with a bit of cordial ball. The cinnabar powders, as directed in the farcy, are no less effectual: and when worms are bred from high feeding, or unwholesome food; rue, garlic, tansey, fennel, box, and many other simples, may be given successfully; being for that purpose mixed with their food; as also cut tobacco, from half an ounce to an ounce a-day.

SECT. XX. Of the Yellows, or Jaundice.

HORSES are frequently subject to this distemper; which is known by a dusky yellowness of the eyes; the inside of the mouth and lips, the tongue, and bars of the roof of the mouth, looking also yellow. The horse is dull, and refuses all manner of food; the fever is slow, yet both that and the yellowness increase together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour; and when it has settled some time on the pavement, it looks red like blood. He stales with some pain and difficulty; and if the distemper is not checked soon, grows delirious and frantic. The off-side of the belly is sometimes hard and distended; and in old horses, when the liver has been long diseased, the cure is not practicable, and ends fatally with a wasting diarrhoea: but when the distemper is recent, and in young horses, there is no fear of a recovery, if the following directions are observed.

First of all bleed plentifully; and give the laxative glyster (p. 120. col. 2. last par.) as horses are apt to be very costive in this distemper; and the next day give him this purge:

TAKE of Indian rhubarb powdered one ounce and a half, saffron two drams, socotorine aloes six drams, syrup of buckthorn a sufficient quantity.

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If the rhubarb should be found too expensive, omit it, and add the same quantity of cream of tartar, and half an ounce of Castile soap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

TAKE of Æthiop's mineral half an ounce, millepedes the same quantity, Castile soap one ounce; make into a ball, and give one every day, and wash it down with a pint of the following decoction.

TAKE madder-root and turmeric of each four ounces, burdock-root sliced half a pound, Monk's rhubarb four ounces, liquorice sliced two ounces; boil in a gallon of forge-water to three quarts; strain off, and sweeten with honey.

Balls of Castile soap and turmeric may be given also for this purpose to the quantity of three or four ounces a-day, and will in most recent cases succeed.

By these means the distemper generally abates in a week, which may be discovered by an alteration in the horse's eyes and mouth; but the medicines must be continued till the yellowness is entirely removed.

Should the distemper prove obstinate, and not submit to this treatment, you must try more potent remedies, viz. mercurial physic, repeated two or three times at proper intervals; and then the following balls.

TAKE salt of tartar two ounces, cinnabar of antimony four ounces, live millepedes and filings of steel of each three ounces, saffron half an ounce, Castile or Venice soap half a pound; make into balls, the size of a pullet's egg, with honey; and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give two or three mild purges; and, if a fat full horse, to put in a rowel.

SECT. XXI. Of the Disorders of the Kidneys and Bladder.

THE signs of the kidneys being hurt or affected are, a weakness of the back and loins, difficulty of staling, faintness, loss of appetite, and deadness in the eyes; the urine is thick, foul, and sometimes bloody, especially after a violent strain. A horse diseased in his kidneys can seldom back, that is, move straight backwards, without pain, which is visible as often as he is put to the trial: the same thing is observable indeed in horses whose backs have been wrung and wrenched; but with this difference, that in the latter there is seldom any defect or alteration in the urine, except that it is higher coloured.

The consequences of a disordered state of the urinary organs are principally two; strangury and diabetes.

1. *Strangury*, or an obstruction of urine, may arise from different causes. When it is not owing to wind, or hardened dung pressing upon the neck of the bladder (as was observed in the section on *Colics*), it may proceed from inflammation in the bladder or kidneys, ulcerations there, or spasms upon any particular part. When owing to inflammation or spasm, the general indications of cure are, to lessen the stricture upon the parts; to reduce the inflammation; and to promote the evacuation of urine: the first of which intentions may be answered by a moderate loss of blood; the second,

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Disorders of the Kidneys, &c. cond, by the use of internal emollients; and the third, by gentle stimulants and mild diuretics.

In stranguary from inflammation or spasm in the parts, the horse makes frequent motions to stale, stands wide and straddling, appears full in the flank, and somewhat dejected. The first measure, as already observed, is bleeding; and that more or less plentifully according to the urgency of the symptoms. In a convenient time after this operation, Mr Taplin recommends to throw up the following emollient glyster:

Stable Dictionary, p. 363.

"TAKE of thin gruel three pints, nitre two ounces, gum arabic one ounce and an half, olive oil four ounces; let it be injected moderately warm, and retained in the body as long as possible.

"So soon after this glyster as the horse is inclined by appetite to receive it, give a mash of two parts malt and one bran, they having been scalded together and stirred till of a moderate warmth; after this, if the subject has not staled in consequence of bleeding, glyster, and mash, have the following balls expeditiously prepared to forward the evacuation:

"TAKE Castile soap ten drams, sal prunella one ounce, camphire two drams, aniseed powder six drams, oil of juniper one dram and an half, syrup of marshmallows sufficient to make the mash; which divide into two equal parts, giving one in six hours after the other, if the former is not successful.

"These are very safe, mild, and efficacious, in general producing the desired effect without any uneasy sensations. Where a drink is preferred, as coming into a more applicable mode of administration, the following will prove equally serviceable:

"TAKE juniper berries (bruised) two ounces; boil in a pint and a half of water for some time, then strain (to produce by squeezing the berries three quarters of a pint); to this add of nitre and gum Arabic (in powder) each an ounce.

"This drink, or the above ball, to be repeated at distinct periods of four hours each (if a repetition of the first at the end of six hours does not effect the desired purpose), till relief is obtained by plentiful evacuations."

As a suppression of urine arises sometimes from an inflammation of the parts; so at others from a paralytic affection, particularly of the kidneys, disabling them in their office of separating the urine from the blood: in this latter case, a general suppression taking place, the bladder is usually empty, so that a horse will make no motion to stale; and if he survives a few days in this condition, his body will swell to a great degree, break out in blotches all over, and death will soon close the scene.

Stranguary sometimes also arises from an ulceration of the parts; which is a case almost as desperate as the preceding. The symptoms are: A visible disquietude; the evacuation not totally suppressed, being only at times obstructed; the urine frequently altering its appearance, being sometimes thick, depositing a turbid sediment as if impregnated with membranous matter; and at other times tinged with blood, the evident effect of a corroded solution of the diseased part. In this instance the following balls or

drink are recommended by Mr Taplin as the only probable means of relief.

"TAKE of myrrh one ounce, Castile soap and Locatelli's balsam each three ounces, nitre and aniseed (in powder) each two ounces, balsam of Peru six drams. Mix together with syrup of marshmallows, and divide into six balls, giving one every morning.

In case spasm of the parts be also suspected, the following ball may be given, and repeated at such times as the circumstances of the case may render proper.

"TAKE of Castile soap half an ounce; nitre, rosin, and compound powder of gum tragacanth, each two drams; opium (in powder) ten grains; oil of juniper 30 drops.—Mix.

"The following drink may be substituted with equal effect if a liquid form is preferred:

"TAKE thin gruel three quarters of a pint, gum arabic and nitre (in powder) each one ounce, liquid laudanum three drams.—Mix.

"This (as the ball above) may be occasionally repeated."

2. Horses subject to a *diabetes*, or profuse staling, if old, or of a weak constitution, are seldom cured; they soon lose their flesh and appetite, grow feeble, their coat staring, and they die rotten. Of a young horse there are more hopes; but he must not be indulged with too much water or moist food. Give him the following:

TAKE jesuits bark four ounces, bistort and tormentil-root of each two ounces; boil in two gallons of lime-water to the consumption of half, and give a pint three times a-day.

As this disorder generally proceeds from too violent exercise, over-straining, &c. repeated bleedings in small quantities are absolutely necessary, till the mouths of the vessels close up.

SECT. XXII. Of Molten-grease.

By molten-grease is meant a fat or oily discharge with the dung; and it arises from a colliquation or melting down of the fat of a horse's body by violent exercise in very hot weather. It is always attended with a fever, heat, restlessness, starting and tremblings, great inward sickness, shortness of breath, and sometimes with the symptoms of a pleurisy. His dung will be extremely greasy, and he will fall into a scouring; his blood will have a thick skin or fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part or sediment is commonly a mixture of size and grease, which makes it so extremely slippery, that it will not adhere to the fingers, and the small portion of serum feels also slippery and clammy. The horse soon loses his flesh and fat, which probably is dissolved and absorbed into the blood; and those that survive this shock commonly grow hide-bound for a time, their legs swelling both before and behind, and continue in this state till the blood and juices are rectified; and if this is not done effectually, the farcy or some obstinate surfeit generally follows, very difficult to remove.

In the first place bleed plentifully, and repeat it for

S

two

Molten-grease.

Ibid. p. 368.

Ibid. p. 369.

Hide-
bound, Sur-
feits, &c.

two or three days successively in smaller quantities; two or three rowels should also be immediately put in, and the cooling emollient glysters (p. 121. col. 1. par. 1, 2.) daily thrown up to abate the fever, and drain off the greasy matter from the intestines. By the mouth give plenty of warm water or gruel, with cream of tartar or nitre, to dilute and attenuate the blood, which in this case is greatly disposed to run into grumes, and endanger a total stagnation.

When the fever is quite gone off, and the horse has recovered his appetite, gentle aloetic purges should be given once a week, for a month or six weeks, in order to bring down the swelled legs. To this end give the following; which, repeated for some time, will entirely remove this disorder.

TAKE of socotorine aloes six drams, of gum guaiacum powdered half an ounce, of diaphoretic antimony and powder of myrrh each two drams; make into a ball with syrup of buckthorn.

These will seldom take a horse from his business above two or three days in a week; neither will he lose his flesh or appetite with them, but on the contrary mend in both; which cannot be obtained by any other method of purging, and gives this greatly the preference in many cases.

SECT. XXIII. Of Hidebound, Surfeits, and Mange.

1. THE signs of *Hidebound* are, "a want of flexibility in the skin, which is pervaded by a general stiffness that seems to form an entire adhesion to the flesh, without the least partial separation or distinction. There is a kind of dusty scurf, plainly perceived underneath the hair, that raises it up in different parts; and, giving it another hue, the coat in many places forms an appearance of two or three colours; conveying, even in this trifling circumstance, a very forcible idea of poverty in both food and raiment. The horse is generally languid, dull, heavy, and weak; his excrement is dark, foul, and offensive; he sweats much upon very moderate exertions; then his coat itches, the hair turns different ways (which in its effluvia is disagreeable), and affords evident proof of weakness and debilitation.

Bad food and want of stable care are, in general, the only probable reasons that can be assigned for this complaint. Long lank grass in low swampy land in autumn, and musty hay or bad oats at any season, may in some degree allay the hunger, but not gratify the appetite; for, being in itself destitute of the effect and quality of superior food, no nutritive contribution can be conveyed for the generating of blood or formation of flesh. The sources for the supply of chyle being thus obstructed, the lymphatics are deprived of their due proportion of nutritive fluid that should pass through these smaller vessels; and they become not only in some measure contracted, but in a great degree inactive, which, with the want of proper external care and dressing, contribute to an almost universal obstruction of the cutaneous pores. These, from the preternatural debilitation of the general system, are thrown open by the most moderate exercise.

In respect to its cure very few directions will be ne-

cessary, the case being no more than a temporary inconvenience, rather than a disease. Therefore, by way of affording some little change to the circulation, take away a small quantity of blood; and in three or four hours after, increase its *impetus* by a mash of malt, oats, and bran, equal parts. Continue this mash every night for a fortnight, stirring in two ounces of flour of brimstone every other night; and for his other feeds (morning and noon) give equal parts of oats and bran, with half a pint of old beans in each, to prevent relaxing the body too much by the mashes. At the same time, regular and substantial dressing, air, exercise, sound oats, sweet hay, and good soft water, will greatly contribute to promote the cure. And when by these means he has visibly improved in hide, coat, and condition, let him have twice in a week a brushing gallop, to produce a moderate sweat and promote the circulation; taking great care not to let him stand still till he is perfectly cool; when his dressings should be thoroughly gone through with attention, care, and perseverance, every night and morning. If this method should be unattended with success, there will be reason to suspect some unknown cause lurking behind; in which case go through a mild course of physic, feeding well between the doses.

2. Of *Surfeits*, according to Mr Taplin, there are two kinds, originating from different causes: One being no more than a very advanced stage of the case last described; which being long neglected, all its symptoms increase, till the entire mass of blood being at last affected, the virulence of the disorder displays itself upon the surface of the body.

The other kind of surfeit, differing from the former in cause, but very little in effect, is that where, from ignorance or inattention, a horse is suffered to drink immoderately of cold water, when in a violent perspiration, and the blood consequently in the highest degree of circulation.

The circulating fluid being so instantaneously checked by the influence of the frigid element and the sudden contraction of the solids, the crassamentum becomes immediately thickened and inflamed; while the serum or watery part, separating from the other, extravasates itself; and, by an effort of nature, is propelled to the skin for transpiration, where the pores (having been instantly collapsed at the time of the water's taking effect) are so closely obstructed that its passage to the surface is rendered impracticable. In this situation it becomes united with the perspirable matter already confined there; and is, in the course of time, compelled by the progress of internal inflammation to make its way through the skin; upon which it at last appears in a variety of forms and different symptoms, assuming distinct degrees of malignancy, according to the state, habit, and constitution of the subject at the time of attack.

Such, in substance, is Mr Taplin's account of this disorder. The indications of cure are, To resolve the inflammatory crudities, remove cutaneous obstruction, correct the acrimony of the blood, and gently quicken the circulation. The better to effect these, he directs to take away a moderate quantity of blood, that the impetus may be encouraged; to open the body with a few warm mashes; and according to the mildness or in-

Stable Dis-
eases,
p. 114.

Hide-
bound, Sur-
feits, &c.

Hide-
bound, Sur-
feits, &c.

inveteracy of its appearance, to give either two or three mercurial purges, composed of the following ingredients.

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bound, Sur-
feits, &c.

BARBADOES aloes one ounce, jalap (in powder) three drams; calomel, cream of tartar, Castile soap, and ginger (in powder) of each two drams; with syrup of buckthorn sufficient to make a ball.

The doses must be given at proper intervals; particular care being all the while taken to guard against cold on account of the mercury contained in the composition. In three days after the last dose, a course of alteratives must be entered upon, the medicine composed as follows.

ANTIMONY levigated and sulphur each half a pound, Æthiop's mineral and cream of tartar each four ounces. These are to be mixed well together, and divided into twelve equal parts of two ounces each, for twelve doses; one of which must be given every night with the feed of corn; the latter being first sprinkled with water, the better to retain the powders.

These must be continued with the utmost punctuality for a month; during all which time let there be also given two ounces of nitre every morning in a pail of soft water. Should any trifling eschars, scabs, or excoriations, prove obstinate upon any part of the body, they may be washed with equal parts of lye (procured from the soap boilers) and lime-waters.

If in the course of a month no considerable advantage should be produced by the above prescriptions, the doses must be gradually increased from two ounces to two and an half, and in another week to three ounces for each dose, of both the composition and the nitre.

3. *Mange* is a distemper so universally known as to render a particular description unnecessary. It proceeds chiefly from poor feeding: hence it is very little seen amongst horses of any estimation; but is almost entirely confined to the lower class of stables and proprietors.

In a mangy horse the skin is generally tawny, thick, and full of wrinkles, especially about the mane, the loins, and tail; and the little hair that remains in those parts stands almost always straight out or bristly; the ears are commonly naked and without hair, the eye and eye-brows the same; and when it affects the limbs, it gives them the same aspect: yet the skin is not raw, nor peels off, as in the surfeit.

Where this distemper is caught by infection, if taken in time it is very easily cured: and a sulphur ointment is recommended as most effectual for that purpose, rubbed in every day. To purify and cleanse the blood, give antimony and sulphur for some weeks after. There are a great variety of external remedies for this purpose, such as train-oil and gunpowder, tobacco steeped in chamber lye, &c. most of them evidently improper. Solefeyl recommends the following, which has been approved.

TAKE burnt alum and borax in fine powder of each two ounces, white vitriol and verdigris powdered of each four ounces; put them into a clean pot, with two pounds of honey, stirring till they are incorporated; when cold, add two ounces of strong aquafortis.

But when this disorder, as is generally the case, is

contracted by low feeding and poverty of blood, the diet must be mended, and the horse properly indulged with hay and corn. With this view, there must be a constant supply of warm mash, prepared with half malt and half bran, or equal parts of oats and bran, with four ounces of honey dissolved in each: let these be given night and morning, with a feed of dry corn every day at noon. During this treatment (which must be continued a week, to sheathe the acrimony of the fluids, and soften the rigidity of the skin) give one ounce of sulphur in each mash, and one ounce of nitre in water every night and morning. In a week or ten days, when the frame becomes more invigorated, discontinue the mashes, and let the diet be changed to good oats and sweet hay; giving, in the morning and evening feeds, one of the following powders, intermixed with the corn first sprinkled with water:

SULPHUR and prepared antimony each a pound, rubbed well together in a mortar, and then divided into 24 equal parts for as many doses.

Or, Antimony levigated and sulphur of each 12 ounces, liver of antimony and cream of tartar each half a pound.—These to be mixed well together, and divided into the same number of doses as the former.

As to the external treatment; previous to the commencement of the mashes, procure a pail of warm water and a quarter of a pound of soft soap (tied up in a linen rag), and with this, forming a strong lather, let every infected part be thoroughly washed and cleaned, so that no scurf or filth be left upon the surface; then rub tenderly dry with a coarse cloth or separated haybands; and on the following morning begin to rub in upon every part affected a due portion of the following ointment.

WEAK mercurial ointment half a pound, quicksilver four ounces, white hellebore (in powder) three ounces, black pepper (in powder) and oil of tartar each one ounce; with olive oil sufficient to make it of a proper softness.

The unction must be repeated for seven days, ten days, or a fortnight, according to the urgency of the symptoms; and let the powders before mentioned, with the nitre also, be continued for three weeks or a month. Lastly, as soon as the horse appears in a condition to bear it, take away a moderate quantity of blood, and give him afterwards two very mild doses of physic.

SECT. XXIV. Of the Farcin or Farcy.

THE true farcy is properly a disorder of the blood-vessels and their contained fluid; by which, when inveterate, the coats and integuments are so thickened that they become like so many cords.

At first, one or more small swellings, or round buds like grapes or berries, spring out over the veins, and are often exquisitely painful to the touch; in the beginning they are hard, but soon turn into soft blisters, which when broke discharge an oily or bloody ichor, and turn into very foul and ill-disposed ulcers. In some horses it appears on the head only; in some on the external jugular; in others on the plate-vein, and runs downwards on the inside of the fore-arm towards the knee, and very often upwards towards the brisket: in some the farcy shows itself on the hind-parts, about the patterns, and along the large veins on

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the inside of the thigh, rising upwards into the groin, and towards the sheath; and sometimes it makes its appearance on the flanks, and spreads by degrees towards the lower belly, where it often becomes very troublesome.

When the farcy appears on the head only, it is easily cured; especially when it is seated in the cheeks and fore-head, the blood-vessels being here small: but it is more difficult when it affects the lips, the nostrils, the eyes, the kernels under the jaws, and other soft and loose parts, especially if the neck-vein becomes corded. When it begins on the outside of the shoulder or hips, the cure is seldom difficult; but when the farcy arises on the plate-vein, and that vein swells much, and turns corded, and the glands or kernel under the arm-pit are affected, it is hard to cure; but more so when the crural veins within side of the thigh are corded, and beset with buds, which affects the kernels of the groin and the cavernous body of the yard. When the farcy begins on the pasterns or lower limbs, it often becomes very uncertain, unless a timely stop is put to it; for the swelling in those dependent parts grow so excessively large in some constitutions, and the limbs so much disfigured thereby with foul sores and callous ulcerations, that such a horse is seldom fit for any thing afterwards but the meanest drudgery; but it is always a promising sign, wherever the farcy happens to be situated, if it spreads no further. It is usual to affect only one side at a time; but when it passes over to the other, it shows great malignancy: when it arises on the spines, it is then for the most part dangerous; and is always more so to horses that are fat and full of blood, than to those that are in a more moderate case. When the farcy is epidemical, as sometimes happens, it rises on several parts of the body at once, forms nasty foul ulcers, and makes a profuse running of greenish bloody matter from both nostrils; and soon ends in a miserable rot.

When the farcy makes its first appearance on the head, it rises on the cheeks and temples, and looks like a net-work, or small creeping twigs full of berries. Sometimes it inflames the eye, and sometimes little blisters or buds run along the side of the nose. It arises often on the outside of the shoulder, running along the small veins with heat and inflammation; and sometimes a few small buds appear near the withers, and on the outside of the hip. In all these appearances, the disease being superficial, and affecting only the smaller vessels, is easily conquered by the following method, when taken in time; for the simplest farcy, if neglected, may degenerate into the worst sort.

This distemper, then, being of an inflammatory nature, and in a particular manner affecting the blood-vessels, must necessarily require large bleeding, particularly where the horse happens to be fat and full of blood. This always checks the beginning of a farcy, but is of small service afterwards; and if a horse is low in flesh, the loss of too much blood sometimes proves injurious. After bleeding, let the horse have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood and the body; and then give nitre three ounces a-day for three weeks or a month, and anoint the buds or swellings with the following ointment twice a-day.

TAKE ointment of elder four ounces, oil of turpentine

two ounces, sugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot.

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The buds sometimes by this method are dispersed, leaving only little bald spots which the hair soon covers again. When they break and run, if the matter be thick and well digested, they will soon be well: but in order to confirm the cure, and to disperse some little lumps which often remain for some time on the skin without hair, give the liver of antimony for a month; two ounces a-day for a fortnight, and then one ounce a day for the other fortnight: by following this method, a farcy which affects only the small vessels may be stopped in a week or ten days, and soon after totally eradicated.

When the farcin affects the larger blood-vessels, the cure is more difficult; but let it always be attempted early; therefore, on the plate, thigh, or neck-veins appearing corded, bleed immediately on the opposite side, and apply the following to the corded vein.

TAKE oil of turpentine in a pint-bottle six ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by little at a time, otherwise the bottle will burst; when it has done smoking, drop in more oil of vitriol, and so on till all is mixed.

This mixture is one of the best universals in a beginning farcy; but where it is seated in loose fleshy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are necessary.

Rub the parts first with a woollen cloth, and then apply some of the mixture over the buds, and wherever there is any swelling, twice a-day. Give the cooling physic every other day, and then three ounces of nitre every day for some time.

When the farcy begins on the flanks, or towards the lower belly, it often takes its rise from a single puncture of a sharp spur. The pain and smarting is one sure sign to distinguish the farcy from common accidents; the staring of the hair, which stands up like a tuft all round the buds or blisters, and the matter that issues from the buds, which is always purulent and of a clammy greasy consistence, are other certain signs. After bathing with the mixture above mentioned till the ulcers are smooth and healing, should the swelling not subside, to prevent the spreading of the buds, and to disperse them, bathe with either of these mixtures as far as the centre of the belly; and at the same time, give a course of antimonials as will presently be prescribed.

TAKE spirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white-wine vinegar or verjuice six ounces.

Or the following:

TAKE spirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice six ounces, white vitriol dissolved in four ounces of spring-water one ounce. mix together.

In the lower limbs the farcy lies sometimes concealed for a great while; and makes so slow a progress, that it is often mistaken for grease, or for a blow or kick, and goes by the general appellation of a *humour settled there*. In order to distinguish the one from the other, we shall observe, that a kick or bruise is generally attended with a sudden swelling, or a contused wound,

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wound, which for the most part digests easily: the grease is also a smooth swelling that breaks out above the bending of the pasterns backwards; but the farcy begins on the pastern joint usually with one bud, and runs upwards like a knotty crab-tree.

Very simple means have sometimes stopped it, before it has begun to spread; a poultice with bran and verjuice bound round the part and renewed once a-day will often alone succeed; and if proud flesh should arise, touch it with oil of vitriol, or aquafortis, an hour before you apply the poultice; for when the distemper is local, as we suppose it here, it is to be conquered by outward applications.

The following balls are proper in every state of the farcy; and when the distemper has been in its infancy, before the skin was much defaced, has often cured it in a week or two, by giving them only once or twice a-day: but in an old farcy they should be given for two or three months together.

TAKE of native cinnabar, or cinnabar of antimony, eight ounces; long bithwort and gum guaiacum powdered, of each four ounces: make into a paste with honey, and form into balls of the size of a large walnut, and roll them into liquorice-powder.

The tediousness of this course has encouraged the giving of mercurials; and indeed, where they are directed with skill, they must be attended with success: the stronger preparations, as the red and white precipitates, and turbith, being combined with sharp saline parts, may be hazardous and injurious; but the latter given in small quantities have been found very successful in such kind of inveterate disorders. Mr Gibson says, he has given it to a dram at a dose, where the limbs have been greatly swelled; that in 48 hours the sores were all dried up, and the limbs reduced; but that it made the horse so violently sick for several days, and scoured him to such a degree, that it could not be repeated.

Mr Bartlet observes, that the success attending this medicine so suddenly ought to have encouraged Gibson to have made further trials in smaller quantities; which had he done, it is more than probable he would not have been disappointed; for the grand secret in giving mercurials as alteratives, is the introducing them into the blood, without operating on the stomach and bowels; and to do this effectually, they must be given in small quantities, and so bridled as to controul their force on the first passages; taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and safely.

Dr Braken recommends the knots and cords to be rubbed with the mercurial ointment before they break, in order to disperse them; and after breaking, to dress the sores with equal parts of Venice turpentine and quicksilver; if by these means the mouth should become sore, treat as above. This method seems to be effectual, with proper care.

The following is also recommended by the same gentleman:

TAKE butter of antimony and bezoar mineral, of each one ounce; beat up with half a pound of cordial ball; and give the bigness of a walnut, or three quarters of an ounce, every day for two or three weeks, fasting two or three hours after it.

The following mode of treatment and forms of medicine are prescribed by Mr Taplin †.

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Upon the very earliest appearance of the disorder, blood is to be taken away in sufficient quantity. If the horse is in high condition and full of flesh, give him mashes through the day of bleeding and the next day; and on the following morning a purging ball composed of socotorine aloes ten drams, calomel and jalap (in powder) each two drams and a half, rhubarb and ginger of each a dram and a half, with syrup of buckthorn or roses sufficient to form the ball. Let the purge be carefully attended to, and duly worked off. If the physic works favourably, and sets well, let his feed (if his appetite is keen) for four clear days be plentiful, and on the fifth or sixth at farthest repeat his purging ball. If the attack has been violent, or the disorder makes rapid progress, a third dose must be given in like manner. In two days after the course is completed, it is directed to begin upon the following antimonial alteratives, assisted by a regular administration of nitre; both to be continued a month without the most trifling intermission:

PREPARED antimony one pound, common sulphur twelve ounces, cream of tartar eight ounces, and cinnabar of antimony six ounces:

Which being incorporated well in a mortar, is to be divided into twenty equal parts. Of these, one is to be given every night in the corn, first sprinkling with water to ensure its adhesion, and two ounces of nitre are to be mixed with the water every morning, at which time he will generally drink it with the greater avidity as being most thirsty. The buds or swelling upon their first appearance may be well washed with the following twice every day, with a lotion composed of extract of Saturn two ounces, camphorated spirit of wine eight ounces, and distilled vinegar a pint; mixed well together, and kept close stopp'd for use.

In a more advanced or inveterate stage of the distemper, moderate bleeding should be repeated at proper intervals between the physic; and upon the scabs or eschars peeling from the buds, wash them well occasionally with the following:

To two drams of corrosive mercury dissolved in half a pint of British brandy, add a pint of white-wine vinegar, half a pint of spring water, and two ounces of tincture of myrrh; shaking well together.

Or, Sugar of lead and white vitriol each an ounce, distilled vinegar and spring water each one pint, styptic tincture three ounces, well mixed together.

If the ulcers should continue foul, and their edges become callous, very small quantities of the strong mercurial ointment must be gently rubbed into the centre of the most inveterate, once in three or four days, cleansing them occasionally with one of the washes before mentioned. In this case one of the following balls must be given regularly every morning for a month or longer if necessary. The proportion of nitre must be altered to three ounces, and given in the water every evening, the ball being administered in the morning.

Mercurial alterative Ball. TAKE Æthiop's mineral four ounces, milk of brimstone, prepared antimony, cream of tartar, and cinnabar of antimony, each five ounces; honey sufficient to make a mass; which

† P. 141.

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which divide into a dozen equal balls, and roll up in liquorice or aniseed powder.

It may not be improper now to add the symptoms of an incurable farcy, that the owners of such horses may save themselves unnecessary expense and trouble in their endeavours to obtain a cure. When a farcy, by improper applications, or by neglect, has spread and increased, or after long continuance resisted the medicines above recommended; if fresh buds are continually spouting forth, while the old ones remain foul and ill-conditioned; if they rise on the spines of the back and loins; if the horse grows hide-bound, and runs at the nose; if abscesses are formed in the fleshy parts between the interstices of the large muscles; if his eyes look dead and lifeless; if he forsakes his food, and scours often, and his excrements appear thin and of a blackish colour; if the plate or thigh vein continues large and corded after firing and other proper applications; these symptoms denote the distemper to have penetrated internally, and that it will degenerate into an incurable consumption: it is most probable also that the whole mass of fluids are tainted, and become irremediable by art.

Before closing this section, it is proper to take notice of what is called the *water farcy*; which has no resemblance to a true farcy either in its cause, symptoms, or effects, but has only obtained this name through custom and ignorance.—This water-farcy, then, is of two kinds: one the product of a feverish disposition, terminating on the skin, as often happens in epidemical colds; the other is dropical, where the water is not confined to the belly and limbs, but shows itself in several parts of the body by soft swellings yielding to the pressure of the finger. This last kind usually proceeds from foul feeding, or from the latter grass and fog that often comes up in great plenty with continued cold rains, and breeds a sluggish viscid blood. In the former case, we have seen the limbs and whole body enormously swelled, and very hard, the belly and sheath greatly distended; which were as surprisingly reduced in 24 hours, by slight scarifications within-side the leg and thigh with a sharp penknife, and three or four strokes on the skin of the belly on each side the sheath: from these scarifications there was a constant and surprising large dripping of water, which soon relieved the horse; when a few purges completed his recovery.

In the other species of dropy the curative intentions are to discharge the water, recover the crasis or strength of the blood, and brace up the relaxed fibres throughout the whole body. To this end purge once a-week or ten days; and give intermediately either of the following.

TAKE black hellebore fresh gathered, two pounds; wash, bruise, and boil in six quarts of water to four; and then strain out the liquor, and put two quarts of white-wine on the remaining hellebore, and let it infuse warm 48 hours: then strain off, mix both together, and give the horse a pint night and morning.

TAKE nitre two ounces, squills powdered three drams or half an ounce, camphor one dram, honey enough to form into a ball, to be given once a-day alone, or washed down with a horn or two of the above drink.

SECT. XXV. Of Strains in Various Parts.

Strains.

IN all strains, the muscular or tendinous fibres are overstretched; and sometimes ruptured or broke. To form, therefore, a true idea of these disorders, let us first consider every muscle and tendon as composed of springy elastic fibres, which have a proper power of their own to contract and extend themselves; or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus, then, if, by a violent extension of this catgut, you had so overstretched it as to destroy its springiness or elasticity, and was inclined to recover its lost tone, would you for that purpose think of soaking it in oil? And is not the method of treating strains, or overstretched muscles and tendons, full as preposterous, when you bathe or soak them in oily medicines, at a time that they want restringents to brace them up? Yet custom has so established this practice, and fallacious experience seemingly so confirmed it, that it would be a difficult task to convince the illiterate and prejudiced of the absurdity, who, by attributing effects to wrong causes, are led into this error, and the oils usurp the reputation that is due only to rest and quiet: they seem, however, to be aware of the ill consequences, by their adding the hot oils, as spike, turpentine, and origanum; which, though they in some measure guard against the too suppling quality of the other oils, yet the treatment is still too relaxing to be of real service.

And indeed, in all *violent* strains of either tendons or muscles, whatever opinion we may entertain of bathing and anointing with favourite nostrums, which often succeed in slight cases, where perhaps bandage alone would have done; yet it is the latter, with proper resting the relaxed fibres till they have thoroughly recovered their tone, that are the chief things to be depended on; and frequently some months necessary for effecting the cure.

All violent strains of the ligaments, which connect the bones together, especially those of the thigh, require time, and turning out to grass, to a perfect recovery. External applications can avail but little here, the parts affected lying too deep, and so surrounded with muscles that medicine cannot penetrate to them. The sooner, in these cases, a horse is turned out to grass, the better; as the gentle motion in the field will prevent the ligaments and joint-oil from thickening, and of course the joint itself from growing stiff.

When a horse's shoulder is overstrained, he does not put out that leg as the other; but, to prevent pain, sets the sound foot hardily on the ground to save the other; even though he be turned short on the lame side, which motion tries him the most of any. When trotted in hand, instead of putting his leg forward in a right line, he forms a circle with the lame leg; and when he stands in the stable, that leg is advanced before the other.

In order to cure this lameness, first bleed him, and let the whole shoulder be well bathed three times a-day with hot verjuice or vinegar, in which may be dissolved a piece of soap; but if the lameness continues without swelling or inflammation, after resting two or three days, let the muscles be well rubbed for a considerable

Strains. derable time, to make them penetrate, with good opodeldoc, or either of the following mixtures.

TAKE camphorated spirit of wine two ounces, oil of turpentine one ounce; this proportion will prevent the hair coming off.

Or, TAKE the best vinegar half a pint, spirit of vitriol and camphorated spirit of wine of each two ounces.

When the shoulder is very much swelled, it should be fomented with woollen cloths (large enough to cover the whole) wrung out of hot verjuice and spirit of wine; or a fomentation prepared with a strong decoction of wormwood, bay-leaves, and rosemary, to a quart of which may be added half a pint of spirit of wine.

A rowel in the point of the shoulder in this case often does great service; especially if the strain has been very violent, and the swelling very large: but as to boring up the shoulder with a hot iron, and afterwards inflating it, it is both a cruel and absurd treatment: and the pegging up the sound foot, or setting on a patten shoe, to bring the lame shoulder on a stretch, is a most preposterous practice, and directly calculated to render a horse incurably lame; for it can only be necessary in cases the very opposite to this, where the muscles have been long contracted, and we want to stretch them out.

Where poultices can be applied, they are at first undoubtedly very effectual, after bathing with hot vinegar or verjuice; and are to be preferred greatly to cold charges, which, by drying so soon on the part, keep it stiff and uneasy: let them be prepared with oatmeal, rye-flour, or bran boiled up in vinegar, strong-beer or red-wine lees, with lard enough to prevent their growing stiff; and when by these means the inflammation and swelling is brought down, bathe the part twice a-day with either of the above mixtures, opodeldoc, or camphorated spirit of wine; and roll the part three or four inches, both above and below, with a strong linen roller of about two fingers width; which contributes not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themselves.

In strains of the *coffin joint*, that have not been discovered in time, there will grow such a stiffness in the joint, that the horse will only touch the ground with his toe; and the joint cannot be played with the hand: the only method here is repeated blistering, and then firing superficially.

Strains of the *back sinews* are very common; and are easily discovered by the swelling, which extends sometimes from the back-side of the knee down to the heel, but for the most part the horse sets that foot before the other. The tendon should be well bathed three or four times a-day with hot vinegar; and if much swelled, apply the poultices above recommended; and when the swelling is down, bathe with the mixtures above, or with camphorated spirit of wine and oil of amber, in which is dissolved as much camphor as the spirits will take up; and roll up the tendon with a proper bandage or laced stocking; which last, properly fitted to the limb, might be wore to great advantage, not only in these sort of injuries, but in most others, where there is a disposition to the grease, or other swellings of the limbs, from weak and relaxed fibres. Curriers shavings wetted with vinegar have been found use-

ful for this purpose; as has also tar and spirit of wine: but where the tendons have suffered by repeated injuries of this kind, the case will demand blistering, firing, and proper rest.

Strains of the *knees* and *pasterns* arise frequently from kicks or blows: if they are much swelled, apply first the poultices; and when the swelling is abated, bathe with the above, or the following.

TAKE vinegar one pint, camphorated spirit of wine four ounces, white vitriol dissolved in a little water two drams.

Or, TAKE the white of three or four eggs, beat them into a froth with a spoon; to which add an ounce of rock alum finely powdered, spirit of turpentine and wine of each half an ounce; mix them well together.

As great weakness remains in the pasterns after violent strains, the best method is to turn the horse out to graze till he is perfectly recovered; when this cannot be complied with, the general way is to blister and fire.

When a horse is lame in the *stifle*, he generally treads on his toe, and cannot set the heel to the ground. Treat him at first with the vinegar and cooling restraints: but if a large swelling, with puffiness, ensues, foment it well with the discutient fomentation till it disperses; and then bathe the part with any of the above medicines.

A lameness in the *whirl-bone* and hip, is discovered by the horse's dragging his leg after him, and dropping backward on his heel when he trots. If the muscles of the hip are only injured, this kind of lameness is cured easily; but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain. In either case, at first bathe the parts well with the cooling medicines, four or five times a-day: in the muscular strain, this method alone may succeed; but in the ligamentous, it is rest and time only can restore the injured parts to their proper tone.

Strains in the *hook* are to be treated by soaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakness and pain, use the fomentation. If a hardness should remain on the outside, it may be removed by repeated blistering; if within, it may be out of the power of any external applications to remove: however, the joint should be fired gently with small razors or lines pretty close together, and then covered with a mercurial plaster. To the discutient fomentation above mentioned may be added crude sal ammoniac, with a handful of wood-ashes boiled in it.

The blistering ointment for the above purposes may be found in the Section of *Bone-spavin*; but the sublimate should be omitted.

The *firing*, so generally used for the strengthening relaxed sinews or tendons, is made to act upon different parts according to the different notions of the operator. Most usually it is intended to act only on the skin, which, by contracting and hardening it all round the sinews, compresses them more firmly like a bandage. The bowmen of old, it is alleged, submitted to this operation, in order to give strength to the muscles and tendons of their arms. Upon this principle, a proper degree of skill is very requisite to perform it effectually.

effectually on a horse; for a due medium should be observed, and the instrument neither so slightly applied as to scarify the skin only superficially, nor so deep as to wound or cauterise the sinew or its sheath. The lines should be drawn pretty close together, on each side of the joint or sinew, following the course of the hair; no cross lines should be made, as they but disfigure the horse afterwards, without any real use. The firing instrument, or knife, ought to be a little rounded on the edge, gradually thickening to the back, that it may retain the heat for some time, but should not be applied till the flaming redness is partly gone off. The cauterized parts may be bathed with spirit of wine at first; and anointed afterwards with bees-wax and oil, which alone is sufficient to complete the cure. But, in every view, this operation deserves to be condemned, upon the following judicious observations of Osmer. "Between the tendon and the skin of the leg, as nothing intervenes but a thin membrane, what hand can determine betwixt the boundaries of those bodies, whose appearance, by the heat of the iron, is made undistinguishable to the eye? Now mark the event of firing. If the fire reaches no further than the skin, little advantage can accrue to the tendon, but the fibres of the skin will become contracted and less pliant; if the fire reaches the membrane or sheath of the tendon, some of its glands are destroyed, and the tendon becomes more or less rigid. If the tendon be burnt, the consequence will be still worse; and in either case the velocity of motion will be impeded: on all these occasions the horse should be turned to grass and indulged with proper rest, that the diseased parts may recover their former firmness, tone, and strength."

SECT. XXVI. Of Tumors and Imposthumes.

TUMORS, or swellings, arise either from external injuries or internal causes.

1. Swellings caused by external accidents, as blows and bruises, should at first be treated with refringents: Thus, let the part be bathed frequently with hot vinegar or verjuice; and, where it will admit of bandage, let a flannel wetted with the same be rolled on: if by this method the swelling does not subside, apply, especially on the legs, a poultice with red-wine lees, strong-beer grounds, and oatmeal, or with vinegar, oil, and oatmeal: either of these may be continued twice a-day, after bathing, till the swelling abates; when, in order to disperse it entirely, the vinegar should be changed for camphorated spirit of wine, to four ounces of which may be added one of spirit of sal ammoniac; or it may be bathed with a mixture of two ounces of crude sal ammoniac boiled in a quart of chamber-lye twice a-day, and rags dipped in the same may be rolled on.

Fomentation made by boiling wormwood, bay-leaves, and rosemary, and adding a proper quantity of spirits, are often of great service to thin the juices, and fit them for transpiration; especially if the injury has affected the joints.

But in bruises, where the extravasated blood will not by these means be dispersed, the shortest way is to open the skin, and let out the grumes.

Critical tumors or swellings, which terminate fevers, should by no means be dispersed; except when they fall on the pastern or coffin joint, so as to endan-

N^o 124.

ger them: in this case the discutient fomentation, (p. 143. col. 1.) should be applied three or four times a-day, and a cloth or flannel frequently wrung out of the same should be bound on, in order to keep the joint continually breathing.

But all tumors tending to certain maturation (from whatever cause they originated), should be expeditiously assisted by fomentation as already directed; and, after each time of using the fomentation, the ripening encouraged by suppurating poultices wherever they can be applied: oatmeal boiled soft in milk, to which a proper quantity of oil and lard is added, may answer this purpose; or the poultice recommended in the Section of *Strangles*. These applications must be regularly continued till the matter is perceived to fluctuate under the fingers, when it ought to be let out; for which purpose, let the tumor be opened with a knife or strong lancet, the whole length of the swelling, if it can be done safely; for nothing contributes so much to a kind healing as the matter's having a free discharge, and the opening's being big enough to dress to the bottom.

Pledgets of tow or lint spread with black or yellow basilicon (or the wound ointment), and dipped in the same, melted down with a fifth part of oil of turpentine, should be applied to the bottom of the sore, and filled up lightly with the same, without cramming: it may be thus dressed once or twice a-day, if the discharge is great, till a proper digestion is procured; when it should be changed for pledgets spread with the red precipitate ointment, applied in the same manner.

Should the sore not digest kindly, but run a thin water and look pale, foment, as often as you dress, with the above fomentation; and apply over your dressing the strong-beer poultice, and continue this method till the matter grows thick, and the sore florid.

The following ointments will generally answer your expectations in all common cases; and may be prepared without, as well as with, the verdigrease.

TAKE Venice turpentine and bees-wax of each a pound, oil of olives one pound and a half, yellow rosin 12 ounces; when melted together, two or three ounces of verdigrease, finely powdered, may be stirred in, and kept so till cold, to prevent its subsiding.

TAKE of yellow basilicon, or the above ointment, without verdigrease, four ounces; red precipitate, finely powdered, half an ounce: mix them together cold with a knife or spatula.

This last, applied early, will prevent a fungus, or proud flesh, from shooting out: for if you dress too long with the above digestive, the fungus will rise fast, and give some trouble to suppress it; when it will be necessary to wash the sore, as often as you dress, with a solution of blue vitriol in water, or to sprinkle it with burnt alum and precipitate. If these should not be powerful enough, touch with a caustic, or wash with the sublimate water made by dissolving half an ounce of corrosive sublimate in a pint of lime-water.

But this trouble may in a great measure be prevented, if the sore is on a part where bandages can be applied with compresses of linen-cloth: for even when these excrescences regerminate, as it were, under the knife, and spring up in spite of the caustics above

Tumors
and Im-
polthumes.

mentioned, they are to be subdued by moderate compression made on the sprouting fibres by these means.

As soon as the wound is skinned over, throwing aside all greasy applications, let the surface be hardened first with equal parts of tincture of myrrh and vinegar, afterwards with tincture of myrrh alone. If any eschar of consequence should remain, and the hair not follow kindly, rub the part gently every night with a small quantity of camphorated spermaceti ointment, the best article known to promote the return of the hair upon the knees or any other part.

Authors on farriery have given in general very proper receipts to answer every intention of this kind by medicines: but as they have not laid down sufficient rules for their application in those cases where they are most wanted, the following general directions will not be unacceptable; as the difficulty in healing some kinds of sores arises frequently from the unskilful manner of dressing them.

It may be necessary then to observe here, once for all, that the cures of most sores are effected by the simplest methods; and that it is often of much more consequence to know how to dress a sore, than what to dress it with. And in this consists indeed the chief art of this branch of surgery: for the most eminent in that profession have long since discovered, that variety of ointments and salves are unnecessary in the cure of most wounds and sores; and they have accordingly discarded the greatest part formerly in repute for that purpose; repeated observations having taught them, that, after the digestion, nature is generally disposed to heal up the wound fast enough herself; and that the surgeon's chief care is to prevent a luxuriancy, commonly called *proud flesh*; which all ointments, wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and supple; and which dry lint alone, early applied, as easily prevents, by its absorbing quality, and light compression on the sprouting fibres.

Thus, if a hollow wound or sore is crammed with tents, or the dressings are applied too hard, the tender shoots of flesh from the bottom are prevented pushing up; and the sides of the sore from this distension may in time grow horny and turn fistulous; nor has the matter by this method a free discharge.

On the other hand, if sores of any depth are dressed superficially, the external parts being more disposed to heal and come together than the internal, they will fall into contact, or heal too soon; and the sore, not filling up properly from the bottom, will break out afresh.

Hence we may justly conceive how little stress is to be laid on famous ointments, or family salves, unskilfully applied; for unless this due medium is observed, or obtained in the dressing, no hollow sore can heal up properly.

As soon then as a good digestion is procured (which is known by the thickness and whiteness of the matter discharged, and the florid red colour at the bottom of the sore), let the dressings be changed for the precipitate medicine; or the sore may be filled up with dry lint alone, or dipped in lime-water, with a little honey and tincture of myrrh, or brandy, about a fifth part of the latter to one of the former: a pledget of lint, dipped in this mixture, should also be applied to the bottom of the sore, which should be filled up with

others to the surface or edges, but not crammed in too hard, as before observed, nor yet applied too loosely.

By this method, the sore would incarnate, or heal up properly, and soft spongy flesh would be prevented or suppressed in time; whereas when ointments or salves are too long continued, a fungus, or proud flesh, is thereby so encouraged in its growth, that it requires some time to destroy and eat it down again: a proper compress of cloth, and a linen roller, is absolutely necessary both for this purpose and to secure on the dressings, wherever they can conveniently be applied.

2. Scrofulous tumors are such as originate in scorbutic or hereditary taints, and increase or diminish according to the state or acrimony of the blood. For these the principal application is the strongest mercurial unguent, thus prepared.

QUICKSILVER two ounces, lard six ounces, balsam of sulphur half an ounce. The quicksilver to be rubbed with the balsam in a metal mortar till the globules disappear; then the lard (first made warm) to be added by degrees.

The use of this unguent must be assisted by a course of mercurial and antimonial alteratives.

3. The other tumors that may be here noticed are the oedematous, steatomatous, and encysted. The oedematous and encysted tumors are nearly synonymous, originating in a cyst or bag, containing a kind of ichorous bloody sanies or gelatinous fluid; which being evacuated, the cyst does not always submit to digestives or escharotics, but must be extirpated with the knife, and cured as a common wound.

The steatomatous are those tumors that form on different parts, and pass in general under the denomination of *wens*, containing, when opened or extracted, a substance not unlike suet when hardly cold.

Neither of the above are expected to submit to any topical application, unless upon the very first observation; when an attempt may be made by the most powerful repellents, and a small portion of the above mercurial ointment rubbed in every night, for a considerable length of time; but no radical cure can be in general obtained but by instrumental extirpation; and as this must be unavoidably attended with loss of time, and a proportional share of danger, if seated upon or intersected by the muscular parts, perhaps it may be most prudent to omit the experiment and submit it to chance.

SECT. XXVII. Of Wounds in General.

In all fresh wounds made by cutting instruments, there is nothing more required than bringing the lips of the wound into contact by future or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and across some of the large muscles, the stitches are apt to burst on the horse's lying down and rising up in the stall. In such cases, the lips should not be brought close together: one stitch is sufficient for a wound two inches long; but in large wounds, they should be at an inch or more distance; and if the wound is deep in the muscles, care should be taken to pass the needles proportionably deep, otherwise the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the first step should be to secure it, by passing a crooked needle underneath, and tying it up with a

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Wounds in
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waxed thread: if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding vessels, dipped in a strong solution of blue vitriol, styptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, &c. and remember always to apply it close to the mouth of the bleeding vessels, and take care that it is kept there by proper compress and bandage till an eschar is formed; otherwise it will elude your expectations, and frequently alarm you with fresh bleedings.

In a memoir presented to the Royal Academy of Sciences by M. La Fosse, he gives an account of the success he had met with in stopping the bleedings of very considerable arteries in horses, by the application of the powder of puff-balls, the arteries cicatrizing by this means only, without any succeeding hæmorrhage. The lycoperdon, or puff-ball, was made use of for this purpose in human subjects, about 170 years ago, by Felix Wurtz, a famous old surgeon in Germany; but he does not seem to have thought of trusting to it in such considerable arteries as M. La Fosse mentions, viz. those of the leg and thigh, the bleedings from which divided vessels he stopt in a few minutes by the use of this powder only. The agaric of the oak may also be used for this purpose, where it can be retained by a proper bandage.

These applications, as indeed all styptics, seem to act by constringing the extremity of the vessel, or choaking it up, till a grume of blood is formed internally, which plugs up the orifice; and has been found to adhere to it so as to constitute one body with the vessel.

We avoid setting down any famous receipts for fresh wounds, whether ointments, or Friar's balsams, being well assured, that, in a healthy sound constitution, nature furnishes the best balsam, and performs herself the cure, which is so often attributed to the medicine; when it is otherwise, and the blood is deprived of its balsamic state, as will appear from the aspect of the wound and its manner of healing, it must be rectified by proper internal medicines, before a good foundation for healing can be laid by any external application whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledget of tow spread with the wound ointment, (see page 144. col. 2.) the directions in the preceding sections being observed, and the wounded part kept as much as possible from motion.

Punctured wounds from thorns, or any other accidents, should be treated in the same manner; applying the beer or bread and milk poultice over the dressing, till some signs of digestion appear; and fomenting the part well every day. This method is also very successfully used to those swellings which often arise on the neck from bleeding; the sores being sprinkled with precipitate, and burnt alum powdered, to fetch out the core or fungous, which choaks up the orifice. The usual method is to introduce a piece of vitriol, or sublimate, which often brings on a plentiful discharge, fetches out the core, and makes a cure; but it is often with the loss of the vein, and it sometimes leaves a large swelling and imposthumation.

In gun-shot wounds, when the ball has not pene-

trated too deep, it should be extracted, if it can be fetched away without disturbance, together with any extraneous bodies that might pass in with it; the wound should be dressed with the old digestive of Venice or common turpentine, divided with the yolks of eggs, to which may be added some honey and tincture of myrrh. The entrance of these wounds frequently requires to be enlarged, and a depending orifice should always be procured if possible; and if the wound should not digest kindly, apply the beer poultice, and foment with the discutient fomentation before mentioned.

In scalds, or burns from gunpowder, or any other cause, when the skin remains entire, bathe the part well, and keep it soaked with rags dipped in spirit of wine camphorated: salt bound thick on the part has been found very effectual for this purpose; and indeed all saline and spirituous applications excel others, while the skin is yet unbroke; but when the skin is separated, anoint the part, and keep it constantly supple with linseed or salad oil, and a plaster spread with bees-wax and oil; if the skin is so scorched, that sloughs must be digested out, dress with the wound-ointment and oil of turpentine, and finish the cure with any drying ointment. Should the horse be feverish from the pain, bleed him, give cooling glysters, and treat him as we have directed in simple fevers.

There are certain wounds which occur much more frequently than any other, and which from that circumstance, though in themselves not at all dangerous, deserve particular notice. Among these are broken knees, over-reaches, and lacerations between hair and hoof. In respect to the first, it is a misfortune whenever it happens that not only reduces the horse very much in his value, but is considered as an indelible stigma of imperfection, that (with connoisseurs) renders him at first sight unworthy a second consideration. This misfortune may sometimes be occasioned by unavoidable accident; but Mr Taplin is justly of opinion that more horses are thrown down and irretrievably injured by the carelessness and shameful inattention of bad riders on bad roads and over rolling stones, or when they are more cruelly exhausted with labour and fatigue, than by any other means in the whole list of accidents.

In relieving this injury, the first step is to wash the parts well with a sponge and warm water, thoroughly cleansing the lacerations from gravel or sand; for these will evidently irritate and inflame the tender parts, and be productive of a discharge which may often be entirely prevented by gently wiping them dry after the use of the sponge, and plentifully embrocating them with a mixture of camphorated spirits and vinegar in equal quantities, bandaging over a pledget of tow wet with the same, and repeating it once or twice if circumstances should render it necessary. This should be continued, that an eschar or cicatrix may be formed to render unctuous or greasy applications unnecessary; but should the wound or laceration be so violent as to produce great inflammation, suppuration must ensue, and ought to be encouraged by the means already directed, and the sore healed in the manner also above directed.

As to over-reaches and other injuries in the feet, they are treated of in their order under *Diseases of the Feet*.

SECT. XXVIII. *Of Ulcers in General.*

WE shall not here enter into a description of each particular species of ulcers, but only lay down some directions for their general treatment; by which means we shall avoid the usual prolixity of authors on this subject, and yet give so general an idea of the nature of ulcers, as we hope will be sufficiently instructive both of the application and of the proper remedy to each.

It may be necessary to observe, that we may often in vain pursue the best methods of cure by external applications, unless we have recourse to proper internal remedies; for as all ulcers, difficult to heal, proceed from a particular indisposition of the blood and juices, before the former can be brought into any order, the latter must be corrected by alteratives and sweetening medicines.

The first intention in the cure of ulcers is bringing them to digest, or discharge a thick matter; which will, in general, be effected by the green ointment, or that with precipitate; but should the fore not digest kindly by these means, but discharge a gleety thin matter, and look pale, you must then have recourse to warmer dressings, such as balsam, or oil of turpentine, melted down with your common digestive, and the strong-beer poultice over them; it is proper also in these kind of sores, where the circulation is languid, and the natural heat abated, to warm the part, and quicken the motion of the blood, by fomenting it well at the time of dressing; which method will thicken the matter, and rouse the native heat of the part, and then the former dressings may be re-applied.

If the lips of the ulcer grow hard or callous, it will be necessary to foment strongly with a decoction of camomile and mallows, as hot as can be conveniently applied; then scarify superficially the whole part, both longitudinally and transversely, with a steam or abscess lancet; so as to entirely penetrate the callous substance upon the surface: after which it must be dressed with digestive ointment twice every day; the fomentation and scarifications to be repeated occasionally, if necessary, till the callosity is quite sloughed off, and comes away with the dressings. A proper ointment for the above purpose may be prepared as follows.

TAKE of yellow basilicon two ounces, and black basilicon one ounce, and melt them together over the fire. When taken off, stir in one ounce of turpentine; and when cool, add half an ounce of red precipitate finely powdered, the whole to be minutely incorporated upon a stone or marble slab.

As soon as the callosity is removed, and the discharge comes to its proper consistence, dress in general with a small portion of lint, thinly covered with either of the basilicons, placed under a pledget of tow spread with the following digestive:

YELLOW wax and black rosin each four ounces, Burgundy pitch two ounces: melt these in a pint of oil olive over a slow fire; and when taken off, stir in two ounces of turpentine. For large wounds, where a plentiful discharge is required, stir into this quantity three ounces of the spirits of turpentine, that it may incorporate in getting cool.

Should the wound incarnate too fast, and fill with fungous flesh, slightly touch such parts with a piece

of unslacked lime, regulating the mode and application by the necessity, and repeating it as occasion may require. When the cicatrix is nearly formed, the cure may be completed by hardening the surface with a little tincture of myrrh.

All sinuses, or cavities, if no tendinous parts intervene, should be instantly laid open (with a bistory) to its utmost extent, and properly filled with a pledget of lint, well impregnated with warm digestive, and plentifully covered with tow spread with the same. After a second or third dressing, should the inside of such cavity prove callous, or hard in substance, it must be taken away by the knife, or destroyed by the means before described. If it be so situated that the parts forbid an entire separation, sound with the probe, and at its extremity make a counter incision through the integuments to meet the probe, till, by passing through, it removes any lodgment that may have been left for the matter to corrode, which it will very soon do, so as in many cases to affect the bone itself.

Where the cavity penetrates deep into the muscles, and a counter opening is impracticable or hazardous; where, by a continuance, the integuments of the muscles are constantly dripping and melting down; in these cases washes may be injected, and will frequently be attended with success. The following is particularly recommended by Mr Taplin.

TAKE honey and vinegar each two ounces; liquefy over the fire; and when cool add tincture of myrrh and tincture of cantharides each one ounce.
—Mix.

When the ulcer is by these means divested of its violence and bad smell, the callosity sloughed off or extracted, and a favourable appearance of incarnation comes on, the dressings may be changed from the precipitate digestive before prescribed, to pledgets spread with Locatellus's balsam, or the following compound.

TAKE white diachylon two ounces, Locatellus's balsam one ounce, and melt them over the fire in two ounces of olive oil. Take off; and when nearly cool, stir in an ounce of balsam of capivi, a little at a time, till it is all incorporated.

These sinuses, or cavities, frequently degenerate into *fishule*, that is, grow pipey, having the inside thickened, and lined, as it were, with a horny callous substance. In order to their cure, they must be laid open, and the hard substance all cut away; where this is impracticable, scarify them well, and trust to the precipitate medicine made strong, rubbing now and then with caustic, butter of antimony, or equal parts of quicksilver and aquafortis.

When a rotten or foul bone is an attendant on an ulcer, the flesh is generally loose and flabby; the discharge oily, thin, and stinking; and the bone discovered to be carious, by its feeling rough to the probe passed through the flesh for that purpose. In order to a cure, the bone must be laid bare, that the rotten part of it be removed: for which purpose, destroy the loose flesh, and dress with dry lint; or the doills may be pressed out of tincture of myrrh or euphorbium. The throwing off the scale is generally a work of nature, which is effected in more or less time, and in proportion to the depth the bone is affected; though burning the foul bone is thought by some to hasten its separation.

Bone-
Spavin.

Where the cure does not properly succeed, mercurial physic should be given, and repeated at proper intervals: and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime-water, are proper for that purpose.

SECT. XXIX. *Of a Bone-Spavin.*

WITHOUT entering at all into the cause of this disorder, which is a bony excrescence, or hard swelling, growing on the inside of the hock of a horse's leg, we shall content ourselves with describing the different kinds thereof by their symptoms, and then enter on their cure.

A spavin, that begins on the lower part of the hock, is not so dangerous as that which puts out higher, between the two round processes of the leg-bone; and a spavin near the edge is not so bad as that which is more inward toward the middle, as it does not so much affect the bending of the hock.

A spavin, that comes by a kick or blow, is at first no true spavin, but a bruise on the bone, or membrane which covers it; therefore not of that consequence as when it proceeds from a natural cause: and those that put out on colts and young horses, are not so bad as those that happen to horses in their full strength and maturity; but in very old horses they are generally incurable.

The usual method of treating this disorder is by blisters and firing; without any regard to the situation, or cause whence it proceeds. Thus, if a fulness on the fore-part of the hock comes upon hard riding, or any other violence, which threatens a spavin; in that case, such coolers and repellers are proper, as are recommended in strains and bruises. Those happening to colts and young horses are generally superficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by severe means.

Various are the prescriptions for the blistering ointment; but the following, on proper experience, stands well recommended by Mr Gibson.

TAKE nerve and marsh-mallow ointment, of each two ounces; quicksilver, one ounce, thoroughly broke with an ounce of Venice turpentine; Spanish flies powdered, a dram and a half; sublimate, one dram; oil of origanum, two drams.

The hair is to be cut as close as possible, and then the ointment applied pretty thick over the part; this should be done in the morning, and the horse kept tied up all day without any litter till night; when he may be untied, in order to lie down; and a pitch or any sticking plaster may be laid over it, and bound on with a broad tape or bandage to keep all close.

After the blister has done running, and the scabs begin to dry and peel off, it may be applied a second time, in the same manner as before; this second application generally taking greater effect than the first, and in colts and young horses makes a perfect cure.

When the spavin has been of long standing, it will require to be renewed, perhaps five or six times: but after the second application, a greater distance of time must be allowed, otherwise it might leave a scar, or cause a baldness; to prevent which, once a fortnight or three weeks is often enough; and it may in this

manner be continued six or seven times, without the least blemish, and will generally be attended with success.

But the spavins that put out on older or full-aged horses are apt to be more obstinate, as being seated more inward; and when they run among the sinuities of the joint, they are for the most part incurable; as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardness.

The usual method in these cases is to fire directly, or to use the strongest kind of caustic blisters; and sometimes to fire and lay the blister immediately over the part: but this way seldom succeeds farther than putting a stop to the growth of the spavin, and is apt to leave both a blemish and stiffness behind; besides the great risk run (by applications of these fiery and caustic medicines to the nervous and tendinous parts about the joints) of exciting violent pain and anguish, and destroying the limb.

The best and safest way, therefore, is to make trial of the blistering ointment above, and to continue it according to the directions there laid down, for some months, if found necessary; the horses in the intervals working moderately: the hardness will thus be dissolved by degrees, and wear away insensibly.

Where the spavin lies deep, and runs so far into the hollow of the joint that no application can reach it; neither firing nor medicines can avail, for the reasons above mentioned; though bold ignorant fellows have sometimes succeeded in cases of this sort (by men of judgment deemed incurable) by the application of caustic ointments with sublimate, which act very forcibly, enter deep, and make a large discharge, and by that means destroy a great part of the substance, and dissolve away the remainder: though, whoever is at all acquainted with the nature of these medicines, must know how dangerous in general their operation is on these occasions; and that a proper prepared cautery made like a steam, under the direction of a skilful hand, may be applied with less danger of injuring either tendons or ligaments. After the substance of the swelling has been properly penetrated by the instrument, it must be kept running by the precipitate medicine, or mild blistering ointment. Where the spavin lies not deep in the joint, and the blistering method will not succeed, the swelling may be safely fired with a thin iron forced pretty deep into the substance, and then should be dressed as is above directed.

SECT. XXX. *Of a Curb and Ring-bone.*

1. As a spavin rises among the bones on the fore-part of the hock, so a curb takes its origin from the junctures of the same bones, and rises on the hind-part, forming a pretty large tumor over the back-part of the hind-leg, attended with stiffness, and sometimes with pain and lameness.

A curb proceeds from the same causes that produce spavins; viz. hard riding, strains, blows, or kicks. The cure at first is generally easy enough effected by blistering, repeated two or three times, or oftener. If it does not submit to this treatment, but grows excessively hard, the quickest and surest way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing several lines in a penniform manner pretty deep; and then to apply a mild blistering

Splents ing plaster or ointment over it.—This method will entirely remove it.

There is another swelling taken notice of on the outside of the hock, which is called a *jarden*. This commonly proceeds from blows and kicks of other horses; but frequently happens to maneged horses, by setting them on their haunches: it is seldom attended with much lameness, unless it has been neglected, or some little process of the bone be broke. It should first be treated with the coolers and repellers in sect. xxxii. art. 2.: but if any swelling continues hard and insensible, the best way is to blister or fire; but the mild blisters alone generally succeed.

2. The *ring-bone* is a hard swelling on the lower part of the pastern, which generally reaches half way round the fore-part thereof, and from its resemblance to a ring has its denomination. It often arises from strains, &c.; and, when behind, from putting young horses too early upon their haunches; for in that attitude a horse throws his whole weight as much, if not more, upon his pasterns, than on his hocks.

When it appears distinctly round the pastern, and does not run downwards toward the coronet, so as to affect the coffin-joint, it is easily cured: but if it takes its origin from some strain or defect in the joint originally, or if a callosity is found under the round ligament that covers that joint, the cure is generally dubious, and sometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horses, will often insensibly wear off of themselves, without the help of any application; but when the substance remains, there needs no other remedy besides blistering, unless when by long continuance it is grown to an obstinate hardness, and then it may require both blistering and firing.

To fire a ring-bone successfully, let the operation be performed with a thinner instrument than the common one, and let the lines or razes be made not above a quarter of an inch distant, crossing them obliquely, somewhat like a chain: apply a mild blister over all, and, when quite dried up, the rupture-plaster; and then turn the horse to grass for some time.

SECT. XXXI. Of Splents.

THESE are hard excrescences that grow on the shank-bone, and are of various shapes and sizes. Some horses are more subject to splents than others; but young horses are most liable to these infirmities, which often wear off and disappear of themselves. Few horses put out splents after they are seven or eight years old, unless they meet with blows or accidents.

A splent that arises in the middle of the shank-bone is nowise dangerous; but those that arise on the back part of this bone, when they grow large and press against the back sinew, always cause lameness or stiffness, by rubbing against it: the others, except they are situated near the joints, seldom occasion lameness.

As to the cure of splents, the best way is not to meddle with them, unless they are so large as to disfigure a horse, or are so situated as to endanger his going lame.

Splents in their infancy, and on their first appear-

4.

ance, should be well bathed with vinegar, or old verjuice; which, by strengthening the fibres, often put a stop to their growth: for the membrane covering the bone, and not the bone itself, is here thickened; and in some constitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moisture about the limbs, which is what often gives rise to such excrescences.

Various are the remedies prescribed for this disorder: the usual way is to rub the splent with a round stick or the handle of a hammer till it is almost raw, and then touch it with oil of origanum. Others lay on a pitch-plaster, with a little sublimate or arsenic, to destroy the substance; some use oil of vitriol; some tincture of cantharides: all which methods have at times succeeded; only they are apt to leave a scar, with the loss of hair. Those applications that are of a more caustic nature often do more hurt than good, especially when the splent is grown very hard, as they produce a rottenness, which keeps running several months before the ulcer can be healed, and then leaves an ugly scar.

According to Mr Taplin, the only expectation of cure "without anxiety and difficulty, is to be careful in observing such appearance, in their earliest state; and then seeing that frequent friction is used for a considerable time, twice every day, with the utmost force of the operator's hands, letting the part be well moistened, after each time of rubbing, with a proportion of the following liniment, leaving a pledget of tow wet with the same, bound on pretty firm with two yards of wide tape as a roller:

"TAKE camphorated spirits of wine, and spirits of turpentine, of each four ounces (a quarter of a pint). Mix together.

"OR, Oil of origanum and spirits of turpentine, each half an ounce; camphorated spirits of wine, two ounces.—Mix.

"When this plan has been persevered in for ten days or a fortnight, you will then be able to judge whether any perceptible advantage has been obtained from the force of these powerful repellents: if not, procure two ounces of the strongest mercurial ointment, and let the size of a hazel-nut be well rubbed in upon the part affected, every night and morning, till the whole is consumed, using the roller each night, and taking it off in the morning. If this does not succeed, the best and most speedy method will be the immediate extirpation, by making a longitudinal incision ('without bruising, hammering, &c.') through the integuments, dissecting and extracting the substance, completing the cure by taking up a couple of stitches, and treating it as a superficial wound; for which directions will be found under that head."

SECT. XXXII. Of the Poll-evil; Fistula, and Bruises on the Withers; Warbles on the Back, and Sit-fists.

1. THE *poll-evil* is an abscess near the poll of a horse, formed in the sinuses between the poll-bone and the uppermost vertebrae of the neck.

If it proceeds from blows, bruises, or any external violence, at first bathe the swelling often with hot vinegar; and if the hair be fretted off with an oozing through:

Poll evil,
Fistula, &c.

Poll evil,
Fistula, &c.

through the skin, make use of two parts of vinegar and one of spirit of wine; but if there be an itching, with heat and inflammation, the safest way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the assistance of physic, will frequently disperse the swelling and prevent this evil.

But when the tumour is critical, and has all the signs of matter, the best method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and bursts of itself; or if opened with a knife, great care should be taken to avoid the tendinous ligament that runs along the neck under the mane; when matter is on both sides, the opening must be made on each side, and the ligament remain undivided.

If the matter flows in great quantities, resembles melted glue, and is of an oily consistence, it will require a second incision, especially if any cavities are discovered by the finger or probe; these should be opened by the knife, the orifices made depending, and the wound dressed with the common digestive of turpentine, honey, and tincture of myrrh, and, after digestion, with the precipitate ointment; or wash with the following made hot, and fill up the cavity with tow soaked in it:

VINEGAR or spirit of wine half a pint, white vitriol dissolved in spring-water half an ounce, tincture of myrrh four ounces.

This may be made sharper by adding more vitriol; but if the flesh is very luxuriant, it should first be pared down with a knife before the application. With this wash alone Mr Gibson has cured this disorder without any other formality of dressing, washing with it twice a day, and laying over the part a quantity of tow soaked in vinegar and the white of eggs beat together.

But the most compendious method of cure, is that by *scalding*, as the farriers term it; and which used to be prosecuted when the sore was foul, of a bad disposition, and attended with a profusion of matter. But the cruelty, absurdity, and inutility of the practice have become so apparent, as that it seems now to be almost universally exploded; so that it would be superfluous to give any description of the operation.

2. *Bruises* on the *withers* frequently imposthume, and for want of care turn fistulous. They arise often from pinches of the saddle, and should be treated with repellers: for this purpose bathe the tumor well with hot vinegar three or four times a-day; if that does not succeed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol dissolved in a little water, and added to the same quantity. These are generally held as very effectual repellers for this purpose in horses, and will frequently prevent imposthuration: when the swelling is attended with heat, smarting, and little hot watery pimples, the following mixture will then be more proper to bathe with.

TAKE two ounces of crude sal ammoniac, boiled in a quart of lime-water; where that cannot be had, a handful of pearl or wood ashes may be boiled in common water: pour off the decoction when settled, and mix with it half a pint of spirit of wine: anoint the part afterwards with linseed oil, or elder ointment, to soften and smooth the skin.

But when the swellings are critical, the consequence

of a fever settled on this part, you must avoid the repelling method, and assist in bringing the swelling to matter, by means of suppurating poultices: experienced farriers advise, never to open these tumors till they break of themselves: for if they are opened before they are ripe, the whole fore will be spongy, and discharge a bloody ichor, which soon degenerates into a sordid ulcer. But take care to enlarge the openings, and pare away the lips, that your dressings may be applied easily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the opposite side, open it in the same manner; but take care they incline downwards, for the sake of depending orifices, and letting the matter flow off easily. For the method of dressing, we must refer to the former part of this Section; and if the bones should be found foul, they must be dressed with tincture of myrrh till they scale off. If the fungus is very troublesome, and the discharge oily, yellow, and viscid, pledgets soaked in the following, made hot, have been found very effectual, bathing the swelling round with spirit of wine and vinegar:

TAKE half an ounce of blue vitriol dissolved in a pint of water; oil of turpentine, and rectified spirit of wine, of each four ounces; white-wine vinegar, six ounces; oil of vitriol and Ægyptiacum, of each two ounces.

When the cavities are truly fistulous, the callosities must be cut out, where it can be done, with a knife; and the remainder destroyed by corrosives.

3. *Warbles* are small hard tumors under the saddle-part of the horse's back, occasioned by the heat of the saddle in travelling, or its uneasy situation. As soon as the saddle is taken off after a severe chase or hard journey, a good groom or hostler will be very minute in his examinations to discover whether an injury has been sustained in this part or any other. He will instantly perceive, by the horse's wincing, whether there is any defect from which a warble may speedily ensue; if so, upon the first appearance, or earliest discovery, bathe three or four times a-day with the following repellent:

Extract of Saturn half an ounce, camphorated spirit of wine two ounces, soft water a quarter of a pint; the extract and spirit being well mixed by shaking, before adding the water.

4. *A sit-fast* proceeds generally from a warble, and is the horse's hide turned horny or callous. In some little time the hair comes off, and it bears the appearance of a foreign solid substance, fixed in the centre of what seems to be a superficial wound. For this simple and very trifling complaint there is but one certain and expeditious cure, namely, *extirpation*; which may be performed with a common penknife. But the most ready and least painful method of taking it off is by just raising either edge till it can be taken hold of with a pair of common pincers; when, by leaning them to any side, you have an immediate fulcrum, or lever, and separate it instantaneously without pain or inconvenience. After the extirpation, it may be treated as a simple superficial laceration, and may in general be healed by a frequent application of Friar's balsam, tincture of myrrh, or even with a little common brandy. Due care, however, should always be taken to guard the cicatrix in its infancy, and prevent the buckle

Poll-evil
Fistula, &c.

Poll-evil,
Fistula, &c.

buckle of the girth from coming into direct contact with the injured part, not only till the surface is sufficiently hardened to render a repetition unlikely, but upon all future occasions.

Treatise
on the Pre-
vention of the
Diseases of
Horses,
p. 245.

SOME parts of the above treatment of tumors, however, has been condemned, and a more simple method by means of setons recommended, by that judicious practitioner Mr Clark of Edinburgh. "The common method (says he†) of treating those large tumors which are seated on the upper part of the neck, immediately behind the ears, generally known by the name of the *poll-evil*, and those which are seated on the withers or upper parts of the shoulders, is exceedingly improper. They are either allowed to break of themselves, or are opened the whole length of the tumor on the upper part. In this situation, especially in the *poll-evil*, when the head is always kept in an erect position, the matter contained in the tumor cannot be discharged from it, but is retained in the bottom of the wound, and exposed to the external air, &c. : it soon acquires a most ichorous corroding quality, and produces one of the largest and the most horrid fistulous ulcers that horses are infested with: a great quantity of fungous or proud flesh is soon produced; this requires to be repeatedly extirpated with the knife, the loss of which cannot be again supplied; hence the horse is greatly disfigured, the cure becomes both tedious and uncertain, and is seldom radical. In some cases, I have known the vertebrae of the neck affected by the sharpness of the confined matter, forming lodgments there, and, after great trouble and expence, the horses were put to death.

"All these kinds of tumors, &c. are easily and speedily discussed by the use of setons, without any loss of substance, or disfiguring of the parts, and cured with the greatest certainty when the operation is properly performed. Of a number of cases, in my practice, where this operation has succeeded with great expedition in curing these tumors, I shall only mention the following.

"About six years ago, an Arabian horse, belonging to a gentleman in this place, had a large tumor seated a little on one side of the withers, or upper part of the shoulder; it was forwarded by applying emollient poultices; and as soon as the matter was perceived to fluctuate in the tumor, a large seton needle, armed with a cord at the other end, was introduced at the upper part of the swelling, and brought out at the under or lowermost part of it; the matter was discharged at the lower orifice in a very short time, the tumor was by that means soon discussed, and, in a few weeks, it was entirely healed up, without any scar or blemish remaining, farther than a little baldness about the lower orifice, occasioned by the sharpness of the matter, which likewise soon disappeared, and not the least trace of the disorder remained.

"The other case happened about seven years ago: a coach-horse (belonging to a nobleman in the neighbourhood) had a large tumor a little behind the ears, on the neck, which I have formerly observed is called the *poll-evil*; the tumor extended to both sides of the neck, and was divided in the middle by the mane; the tumor had been opened on one side, in a very superficial manner, by a farrier in the country, before the matter in it was sufficiently digested; after applying

a few emollient poultices, in order to ripen it, a strong seton needle, was introduced at the upper part of it, almost close to the mane, and after passing it through the bottom of the tumor, which was very deep, the needle was brought out through the sound muscular parts below the tumor, in order to procure a sloping or depending orifice for the matter to run freely off. The same operation was likewise performed on the opposite side, beginning near the mane, and finished in the same manner. In a few weeks the cure was completed. The horse run for several years in the same nobleman's carriage, without the smallest vestige of his former disorder.

"From this method of treating these tumors, together with the use of alterative medicines, &c. which in cases of this nature ought never to be omitted, they were entirely discussed, and the perforations made by the needle soon healed up, without the least deformity of the parts. I have therefore given the history of these cases, to show with what facility and expedition such tumors may be carried off by the use of setons, in preference to the common methods used, and even recommended by different authors; such as, after opening these tumors by deep incisions, and pouring into them the most corrosive mixtures, made scalding hot, together with a long tedious course of hot irritating applications, by which the poor animals are kept in the utmost torture for a considerable time, and in the end are so disfigured by the loss of substance, occasioned by the cutting away so much of the flesh from the parts, that such horses are generally rendered unfit for any thing but the meanest drudgery.

"Deep-seated abscesses are cured in the same manner by the use of setons; after tracing the sinuses or cavities of the abscess with a long slender blunt lead probe (which yields easily without forcing its way through the cellular membrane, or taking a direction between the interstices of the muscles), the needle, armed with a cord, should follow the direction of the *sinews* or *pipes*, as they are commonly called, to the most depending part; and in case there should be two or more sinuses, which sometimes happens, each of them should be treated in the same manner, in order to obtain a depending orifice for a free discharge of the matter, and which being once procured, seldom fails of completing a cure."

SECT. XXXIII. Of Wind-galls, Blood and Bog-Spavins.

I. A WIND-GALL is a statulent swelling, which yields to the pressure of the finger, and recovers its shape on the removal thereof; the tumor is visible to the eye, and often seated on both sides of the back finew, above the fetlocks, on the fore-legs, but most frequently on the hind-legs; though they are met with in various parts of the body, wherever membranes can be so separated, that a quantity of air and serosities may be included within their duplicatures.

When they appear near the joints and tendons, they are generally caused by strains or bruises on the sinews, or the sheath that covers them; which, by being over-stretched, have some of their fibres ruptured; whence probably may ouze out that fluid which is commonly found with the included air: though, where these swell-

Wind-galls,
Blood and
Bog Spavins.

Wind-gall,
Blood and
Bog-Spavin.
VIII.

ings show themselves in the interstices of large muscles, which appear blown up like bladders, air alone is the chief fluid; and these may safely be opened, and treated as a common wound.

On the first appearance of wind-galls, their cure should be attempted by restringents and bandage: for which purpose, let the swelling be bathed twice a-day with vinegar, or verjuice alone; or let the part be fomented with a decoction of oak-bark, pomegranate, and alum boiled in verjuice, binding over it, with a roller, a woollen cloth soaked in the same. Some, for this purpose, use red-wine lees, others carriers shavings, wetted with the same, or vinegar, bracing the part up with a firm bandage.

If this method, after a proper trial, should not be found to succeed, authors have advised the swelling to be pierced with an awl, or opened with a knife: but mild blistering has in general the preference given to these methods, the included fluids being thereby drawn off, the impacted air dispersed, and the tumor gradually diminished.

2. A *blood-spavin* is a swelling and dilatation of the vein that runs along the inside of the hock, forming a little soft swelling in the hollow part, and is often attended with a weakness and lameness of the hock.

The cure should be first attempted with the restringents and bandage above recommended, which will contribute greatly to strengthen all weaknesses of the joints, and frequently will remove this disorder if early applied; but if by these means the vein is not reduced to its usual dimensions, the skin should be opened, and the vein tied with a crooked needle and wax-thread passed underneath it, both above and below the swelling, and the turgid part suffered to digest away with the ligatures: for this purpose, the wound may be daily dressed with turpentine, honey, and spirit of wine, incorporated together.

3. A *bog-spavin* is an encysted tumor on the inside of the hough; or, according to Dr Bracken, a collection of brownish gelatinous matter, contained in a bag or cyst, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloses it forming the cyst. This case he has taken the pains to illustrate in a young colt of his own, where he says, When the spavin was pressed hard on the inside of the hough, there was a small tumor on the outside, which convinced him the fluid was within side the joint: he accordingly cut into it; discharged a large quantity of this gelatinous matter; dressed the sore with doffils dipped in oil of turpentine; putting into it, once in three or four days, a powder made of calcined vitriol, alum, and bole: by this method of dressing, the bag sloughed off, and came away, and the cure was successfully completed without any visible scar.

This disorder, according to the above description, will scarcely submit to any other method, except firing, when the cyst ought to be penetrated to make it effectual; but in all obstinate cases that have resisted the above methods, both the cure of this and of the swellings called *wind-galls* should be attempted in this manner. If, through the pain attending the operation or dressings, the joint should swell and inflame, foment it twice a-day, and apply a poultice over the dressings till it is reduced.

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SECT. XXXIV. Of Mallenders and Sallenders.

Mallender
and Saller
ders.

MALLENDERS are cracks in the bend of the horse's knee, that discharge a sharp indigested matter; they are often the occasion of lameness, stiffness, and the horse's tumbling.

Sallenders are the same distemper, situated on the bending of the hough, and occasion a lameness behind.

They are both cured by washing the parts with a lather of soap warmed, or old chamber-lye; and then applying over the cracks a strong mercurial ointment spread on tow, with which they should be dressed night and morning, till all the scabs fall off; if this should not succeed, anoint them night and morning with a little of the following, and apply the above ointment over it.

TAKE hog's lard two ounces, sublimate mercury two drams.

Or, TAKE hog's lard two ounces, oil of vitriol two drams.

Take the next from Gibson, which is to be depended on:

ÆTHIOP's mineral half an ounce, white vitriol one dram, soft green soap six ounces.

Anoint with this often; but first clip away the hair, and clear the scabs. On their drying up, it may be proper to give a gentle purge or two; or the nitreballs may be taken advantageously for a fortnight or three weeks.

SECT. XXXV. Of Lampas, Barbs, and Wolves-Teeth.

1. THE *lampas* is an excrescence in the roof of the horse's mouth, which is sometimes so luxuriant, that it grows above the teeth, and hinders his feeding. The cure is in lightly cauterising the flesh with a hot iron, taking care that it does not penetrate too deep so as to scale off the thin bone that lies under the upper bars; the part may be anointed with burnt alum and honey, which is proper for moist sores in the mouth.

This operation is by some thought to be entirely unnecessary; it being a general observation with them, that all young horses have their mouths more or less full of what are called *lampas*; and that sometimes they rise higher than the fore-teeth; but they further observe, in proportion as a horse grows older, the roof flattens of itself, and the teeth then appear to rise. We are obliged to the ingenious M. La Fosse for this remark, and hope it will be the means of abolishing this cruel and unnecessary operation.

2. *Barbs* are small excrescences, under the tongue, which may be discovered by drawing it aside, and are cured by cutting close off, and washing with brandy or salt and water.

3. A horse is said to have *wolves-teeth*, when the teeth grow in such a manner, that their points prick or wound either the tongue or gums in eating. Old horses are most liable to this infirmity, and whose upper overshoot the under teeth in a great degree.

To remedy this evil, you may either chop off the superfluous parts of the teeth with a chissel and mallet, or file them down, which is the better way, till you have sufficiently wasted them.

SECT.

SECT. XXXVI. *Of the Grease.*

IN order to treat this disorder with some propriety, we shall consider it as arising from two different causes; a fault or relaxation in the vessels, or a bad disposition in the blood and juices. We must here observe, that the blood and juices (or humours, for there are always some in the best state of blood) are brought to the extreme parts by the arteries, and returned by the veins; in which latter, the blood is to rise in perpendicular columns, to return the circulating fluids from the extremities: hence swellings in the legs of horses may easily be accounted for, from a partial stagnation of the blood and juices in the finer vessels, where the circulation is most languid; and especially when there is want of due exercise, and a proper muscular compression on the vessels, to push forward the returning blood, and propel the inert and half-stagnating fluids through their vessels; in short, the blood in such cases cannot so readily ascend as descend, or a greater quantity is brought by the arteries than can be returned by the veins.

The grease then, considered in this light, must be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a disorder where they are both complicated: but when it is an attendant on some other distemper, as the farcy, yellows, dropfy, &c. such diseases must first be cured before the grease can be removed. In the former case, moderate exercise, proper dressing, cleanliness, and external application, will answer the purpose: in the latter, internals must be called in to our assistance, with proper evacuations.

When a horse's heels are first observed to swell in the stable, and subside or go down on exercise; let care be taken to wash them very clean every time he comes in, with soap-suds, chamber-lye, or vinegar and water; which, with proper rubbing, will frequently prevent or remove this complaint: or let them be well bathed twice a-day with old verjuice, or the following mixture, which will brace up the relaxed vessels; and if rags dipped in the same are rolled on, with a proper bandage, for a few days, it is most likely the swellings will soon be removed by this method only, as the bandage will support the vessels till they have recovered their tone. To answer this end also, a laced stocking made of strong canvas or coarse cloth, neatly fitted to the part, would be found extremely serviceable, and might easily be contrived by an ingenious mechanic.

TAKE rectified spirit of wine four ounces; dissolve in it half an ounce of camphor: to which add wine-vinegar or old verjuice six ounces; white vitriol dissolved in a gill of water one ounce; mix together, and shake the phial when used.

But if cracks or scratches are observed, which ooze and run, let the hair be clipped away, as well to prevent a lodgment (which becomes stinking and offensive by its stay), as to give room for washing out dirt or gravel, which, if suffered to remain there, would greatly aggravate the disorder.

When this is the case, or the heels are full of hard scabs, it is necessary to begin the cure with poultices, made either of boiled turnips and lard, with a handful

of linseed powdered; or oat-meal and rye-flour, with a little common turpentine and hog's-lard, boiled up with strong-beer grounds or red-wine lees. The digestive ointment being applied to the sores for two or three days, with either of these poultices over it, will, by softening them, promote a discharge, unload the vessels, and take down the swelling; when they may be dried up with the following:

TAKE white vitriol and burnt alum, of each two ounces; Ægyptiacum one ounce; lime water a quart or three pints: wash the sores with a sponge dipped in this three times a-day; and apply the common white ointment spread on tow, to an ounce of which may be added two drams of sugar of lead.

This method is generally very successful, when the distemper is only local, and requires no internal medicines; but if the horse be full and gross, his legs greatly gorged, so that the hair stares up, and is what some term pen-feathered, and has a large stinking discharge from deep foul sores, you may expect to meet with great trouble, as these disorders are very obstinate to remove, being often occasioned by a poor dropical state of blood, or a general bad disposition in the blood and juices.

The cure in this case, if the horse is full and fleshy, must be begun by bleeding, rowels, and repeated purging; after which, diuretic medicines are frequently given with success. Thus,

TAKE four ounces of yellow rosin, one of sal prunellæ; grind them together with an oiled pestle; add a dram of oil of amber; and give a quart of forge-water every morning, fasting two hours before and after taking, and ride moderately.

As this drink is found very disagreeable to some horses, we would recommend the nitre-balls in its stead, given to the quantity of two ounces a-day for a month or six weeks, mixed up with honey or in his feeds. Take the following also for that purpose, or the diuretic balls directed under *Disorders of the Eyes*.

Yellow rosin four ounces; salt of tartar, and sal prunellæ, of each two ounces; Venice soap, half a pound; oil of juniper, half an ounce; make into balls of two ounce weight, and give one every morning.

The legs in this case should be bathed or fomented, in order to breathe out the stagnant juices, or to thin them, so that they may be able to circulate freely in the common current. For this purpose, foment twice a-day with the discutient fomentation (p. 143. col. 2.), in which a handful or two of wood-ashes has been boiled; apply then the above poultices, or the following, till the swelling has subsided, when the sores may be dressed with the green ointment till they are properly digested, and then dried up with the water and ointment above recommended.

TAKE honey one pound; turpentine six ounces; incorporate with a spoon; and add of the meal of fenugreek and linseed each four ounces; boil in three quarts of red-wine lees to the consistence of a poultice; to which add, when taken from the fire, two ounces of camphor in powder; spread it on thick cloths, and apply warm to the legs, securing it on with a strong roller.

If the sores are very foul, dress them with two parts

of the wound-ointment, and one of *Ægyptiacum*; and apply the following, spread on thick cloths, and rolled on.

TAKE of black soap one pound; honey half a pound; burnt alum four ounces; verdigrease powdered two ounces; wheat-flour a sufficient quantity.

If the diuretic balls should not succeed, they must be changed for the antimonial and mercurial alteratives, already mentioned; but turning a horse out in a field, where he has a hovel or shed to run to at pleasure, would greatly contribute to quicken the cure, and indeed would in general effect it alone; but if this cannot be complied with, let him be turned out in the day-time.

If the horse is not turned out, a large and convenient stall is absolutely necessary, with good dressing and care.

The last thing we shall recommend, is a method to oblige a horse to lie down in the stable. This undoubtedly is of the utmost consequence, as it will not a little contribute to the removal and cure of this disorder; for by only changing the position of his legs, a freer circulation would be obtained, and the swelling taken down; whereas in general it is greatly aggravated by the obstinacy of the horse, who refuses to lie down at all (probably from the pain it gives him to bend his legs for that purpose), by which means the stiffness and swelling increases, till the over-gorged and distended vessels are obliged to give way; and by bursting, discharge the fluids, which should circulate thro' them.

SECT. XXXVII. *Of Scratches, Crown-scabs, Rat-tails, and Capellets.*

1. SCRATCHES in the heels have so much affinity with the grease, and are so often concomitants of that distemper, that the method of treating them may be selected chiefly from the preceding section; which at first should be by the linseed and turnip poultice, with a little common turpentine, to soften them and relax the vessels; the green ointment may then be applied for a few days to promote a discharge, when they may be dried up with the ointments and washes recommended in the above section. It is best afterwards to keep the heels supple, and softened with currier's dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preservative as it is to leather; and, by using it often before exercise, will prevent the scratches, if care is taken to wash the heels with warm water when the horse comes in: When they prove obstinate, and the sores are deep, use the following; but if any cavities or hollow places are formed, they should first be laid open; for no foundation can be laid for healing till you can dress to the bottom.

TAKE Venice turpentine four ounces; quicksilver one ounce; incorporate well together by rubbing some time; and then add honey and sheeps suet of each two ounces.

Anoint with this once or twice a-day; and if the horse is full or fleshy, you must bleed and purge; and if the blood is in a bad state, the alteratives must be given to rectify it.

2. The crown scab is an humour that breaks out

round the coronet, which is very sharp and itching, and attended with a scurfiness: sharp waters prepared with vitriol are generally used for the cure; but the safest way is first to mix marshmallow and yellow basilicon, or the wound-ointment, equal parts, and to spread them on tow, and lay all round the coronet. A dose or two of physic may be very proper, with the diuretic medicines prescribed in the preceding page, and the alteratives above recommended, in rebellious cases. *Vide the Section on Alteratives.*

3. Rat-tails are excrescences which creep from the pattern to the middle of the shanks, and are so called from the resemblance they bear to the tail of a rat. Some are moist, others dry; the former may be treated with the drying ointment and washes, p. 153. col. 2. par. 1. the latter with the mercurial ointment prescribed in the Section of *Strangles*, p. 129. col. 2. If the hardness does not submit to the last medicine, it should be pared off with a knife, and dressed with turpentine, tar, and honey, to which verdigrease or white vitriol may occasionally be added; but before the use of the knife, you may apply this ointment.

TAKE black soap four ounces, quick lime two ounces, vinegar enough to make an ointment.

4. There are particular swellings which horses are subject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow, and are called by the French and Italians *capellets*: they arise often from bruises and other accidents; and when this is the case, should be treated with vinegar and other repellers. But when they grow gradually on both heels or elbows, we may then suspect the blood and juices, in fault, and that some of the vessels are broke and juices extravasated: in this case the suppuration should be promoted, by rubbing the part with marshmallow ointment; and when matter is formed, the skin should be opened with a lancet, in some dependent part towards one side, to avoid a scar; the dressings may be turpentine, honey, and tincture of myrrh. The relaxed skin may be bathed with equal parts of spirit of wine and vinegar, to which an eighth part of oil of vitriol may be added. The contents of these tumors are various; sometimes watery; at others suety, or like thick paste; which, if care be not taken to digest out properly with the cyst, will frequently collect again. Was it not for the disfigurement, the shortest method would be to extirpate them with a knife, which if artfully executed, and the skin properly preserved, would leave very little deformity.

SECT. XXXVIII. *Of Ruptures, Anticor, Diseases of the Mouth, and Colt-evil or Gonorrhœa.*

1. IN regard to ruptures, though they are generally divided into particular classes, we shall only observe, that by violent efforts of the horse, or other accidents, the guts or caul may be forced between the muscles of the belly at the navel, and through the rings of the muscles into the scrotum or cod. The swellings are generally about the size of a man's fist, sometimes much larger, descending to the very hock: they are frequently soft, and yield to the pressure of the hand, when they will return into the cavity of the belly with a rumbling noise: and, in most, the vacuity may be felt through which they passed.

On their first appearance, endeavours should be made

Ruptures,
Anticor,
&c.

to return them by the hand; but if the swelling should be hard and painful, in order to relieve the stricture, and relax the parts through which the gut or caul has passed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a-day, applying over it a poultice made of oatmeal, oil, and vinegar, which should be continued till the swelling grows soft and easier, or the gut is returned. In the mean time, it would be proper to throw up emollient oily glysters twice a-day, and to let the horse's chief diet be boiled barley, scalded malt, or bran.

Should the swelling afterwards return, we apprehend the restraining applications, usually recommended on these occasions, will avail little without a suspensory bandage; so that an ingenious mechanic in that art is chiefly to be relied on for any future assistance; though it has been observed, that with moderate feeding, and gentle exercise, some horses have continued to be very useful under this complaint.

2. The *anticor* is a disorder not very common among our horses, or those in northern climates; but is particularly taken notice of by the French, Spanish, and Italian writers; who describe it a malignant swelling in the breast, which extends sometimes to the very sheath under the belly; it is attended with a fever, great depressions and weakness, and a total loss of appetite.

The cure should be first attempted by large and repeated bleedings, to abate the inflammation; emollient glysters should be injected twice or thrice a-day, with an ounce of sal prunella in each, and the cooling drink in the Section on *Fevers* should be given inwardly; the swelling should be bathed with the marshmallow ointment; and a ripening poultice, with onions boiled in it, should be applied over it. If by this method, continued four or five days, the inflammation in the throat and gullet is removed, our attention should more particularly turn to encourage the swelling at the breast, and bring it, if possible, to matter: to which end, continue the poultice, and give two ounces of Venice treacle dissolved in a pint of beer every night; when the swelling is grown soft, it must be opened with the knife, and dressed with turpentine digestive, the danger now being over.

But should it be found impracticable to bring the swelling to matter, and it increases upwards, so as to endanger suffocation; authors have advised to pierce the tumor with a hot pointed cautery in five or six places; to dress with the above digestive; and, in order to stimulate and promote a greater discharge, to add to it a small quantity of Spanish flies and euphorbium in powder; fomenting at the same time, and bathing the circumjacent parts with ointment of marshmallows. M. Gueriniere, as well as Soleysel, have advised opening the skin, when the tumor cannot be brought to matter, in order to introduce a piece of black hellebore-root steeped in vinegar, and to confine it there for 24 hours: this also is intended as a stimulant; and is said to answer the intention, by occasioning sometimes a swelling as big as a man's head.

3. Besides the disorders of the mouth, which we have already animadverted on, there are frequently observed on the inside the lips and palate, little swellings or bladders called *giggs*. Slitting them open with a knife or lancet, and washing them afterwards with salt and vinegar, is in general their cure; but when

they degenerate into what are called *cankers*, which are known by little white specks, that spread and occasion irregular ulcers, the best method then is to touch them daily with a small flat cautery, moderately heated till the spreading is stopped, and to rub the fores three or four times a day with *Ægyptiacum*, and tincture of myrrh sharpened with oil or spirit of vitriol; when by this dressing the sloughs are separated, they may be washed frequently with a sponge dipped in copperas, or sublimate water, if they continue to spread; or a tincture made by dissolving half an ounce of burnt alum, and two ounces of honey, in a pint of tincture of roses. Either of these will dry them up, and are very useful in most disorders of the mouth.

A relaxation and swelling of the palate sometimes happens to horses on catching cold. To remedy this disorder, blow pepper on the part, or anoint it with the same mixed up with honey. The tincture above mentioned may be used for this purpose, to which may be added half an ounce of spirit of sal ammoniac.

4. The *colt-evil* is supposed to arise from stoned colts having full liberty with mares, before they are able to cover them; whence frequently ensues an excoriation or fretting on the glands and a swelling on the sheath. This last disorder frequently proceeds too from dirt or filth lodging there, and is often removed by washing the part clean with butter and beer: but when the yard itself is swelled, foment it twice a-day with marshmallows boiled in milk, to which may be added a little spirit of wine; anoint the excoriation with the white ointment, or wash it with a sponge dipped in lime, to a pint of which may be added two drams of fugar of lead: the yard should be suspended up to the belly; and if the swelling should increase with the inflammation, bleed, and give the cooling physic, anoint with ointment of alder, and apply the bread-and-milk poultice.

If a simple gonorrhœa or seminal gleet is observed to drip from the yard (which is often the case in high-fed young horses, where a relaxation of the glands and seminal vessels has been brought on by frequent emissions), let the horse be plunged every day into a river or pond; give him two or three rhubarb purges, at proper distances; and intermediately the following balls.

TAKE of balsam of copivi, or Venice turpentine, oil-banum, and mastich powdered, of each two drams; bole armeniac, half an ounce: mix up into a ball with honey, and give it night and morning till the discharge lessens, and then every night till it goes off.

Balls prepared with rhubarb and turpentine may also be given for this purpose; two drams of the former with half an ounce of the latter.

SECT. XXXIX. Preliminary Remarks on DISEASES of the FEET.

I. Of *Greasing, Oiling, and Stuffing Horses Hoofs*. The custom of keeping our finest horses constantly standing upon dry litter and hot dung in the stable, is exceedingly hurtful to the feet and legs, particularly the former, which are always found to agree best with coolness and moisture. Hence we find, that horses hoofs, whilst running in the fields, are always in bet-

Ruptures,
Anticor,
&c.

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the Feet.

* *Observations on the Shoeing of Horses, and on the Diseases of their Feet: from which judicious performance the following sections are extracted.*

ter condition than those that are kept hot and dry in the stable, which, beside being liable to many diseases, are hard, brittle, shattered, and often broken.

With respect to greasy or oily applications, so often prescribed for the hoofs of horses in order to preserve them sound, tough, &c. Mr Clark* very justly condemns them as rather pernicious than salutary.

When young horses (he observes) are first taken from the fields, their hoofs are cool, sound, and tough. These are found from experience to be good qualities. But horses are no sooner introduced into the stable, than their hoofs are greased or oiled two or three times a-week: and if they are kept much in the house standing upon hot dry litter, without being frequently led abroad, and without having an opportunity of getting their hoofs cooled and moistened in wet ground, their hoofs grow so brittle, dry, and hard, that pieces frequently break off, like chips from a hard stone; and, when driving the nails in shoeing, pieces will split off, even although the nails are made very fine and thin. Now, if these same horses with brittle shattered hoofs are turned out to graze in the fields, their hoofs in time will become, as they were originally, sound, tough, and good.

This change must undoubtedly be ascribed to the wet and moisture which the hoofs are exposed to in the fields, of which water is the principal ingredient; and it is a certain fact, of which we have daily proofs, that when all other means fail, horses are turned out to graze in order to recover their decayed brittle hoofs. It is known, that the hoofs of horses are porous; and that insensible perspiration is carried on through these pores, in the same manner, and according to the same laws, as take place in other parts of the body. Now, every body knows, that greasy or oily medicines applied to the skin of the human body, prevent perspiration, which is frequently attended with the worst consequences. The same reasoning will hold with respect to the hoofs of horses; for greasy or oily applications elose or shut up the pores of the hoof, by being absorbed or sucked into its inner substance. Hence the natural moisture which should nourish the hoof, is thereby prevented from arriving at its surface; which, on that account, becomes as it were dead, and consequently dry, brittle, and hard.

The original practice of greasing or oiling horses hoofs, had probably taken its rise, from observing, that grease or oil softened dead substance, such as leather, &c. But this will by no means apply to the hoofs of horses, as there is a very great difference between the living and dead parts of animals; the former having juices, &c. necessary for their own nourishment and support, whilst the latter require such applications as will preserve them from decaying and rotting.

The dealers in horses about London, when they get a bad-footed horse in their hands, moisten his hoofs frequently in water; for which purpose, they keep a puddle of water and dung at the watering place, that when the horse comes to water, his fore-feet may be sunk in the puddle, by which means they are cooled and moistened twice or thrice every day; so that, whilst they are making up his carcase for the market, his hoofs are likewise repaired, and sufficient to stand the test of a trial upon sale. But no sooner do horses with hoofs of this kind come into other hands, their hoofs at the same time being kept dry and greased, &c. than

they degenerate into their former state. Hence the cause of so many complaints that horses turn soon lame after they come from dealers, when, in fact, it proceeds from greasy applications, and neglecting to cool or moisten the hoofs in water; for the careful groom, when airing his master's horses, rather than lead them into a puddle, will go about in order to keep their legs clean and dry.

Another practice equally pernicious, is the stuffing up horses hoofs (as it is called) with hot resinous, and greasy mixtures, under the notion of cooling and softening them. Various are the prescriptions recommended for this purpose, many of which are of a quite opposite nature to the purpose intended.—There is likewise a great impropriety in stuffing up the hoofs with rotten dung and stale urine: this, it is true, is moisture; but of the very worst kind, on account of the salts contained in the urine, which of itself greatly contribute towards hardening and drying their hoofs, in place of softening them; besides the other bad effects which may arise to the frog, &c. from the rottenness of the dung. But, without commenting upon the various compositions or pompous prescriptions recommended in books, or those handed about as receipts for the softening and stuffing horses hoofs, the author would recommend one which is more natural, and ought not to be despised for its simplicity, as it is only cooling and moistening the hoofs with water morning and evening: And, to those who are fond of stuffing, he would prescribe bran and water, or clay, &c. made into the consistency of a poultice; and, in particular cases, where horses stand much in the stable, and the hoofs are disposed to be very hard, dry, and brittle, a poultice of this kind, or any other emollient composition in which water is a principal ingredient, may be applied all round the hoof; or, in imitation of some dealers, to keep a puddle of water at the watering place, which will answer equally well, if not better. From this manner of treatment, the hoofs will be preserved in their natural state, and a free and equal perspiration kept up, by which the nourishment natural to the hoof will have free access to its surface, as it is this only which causes that cohesion of the parts which constitutes a firm, sound, tough hoof.

II. *Of the natural Defects of the Feet.* It is very well known, that different climates and different soils greatly affect the feet of horses. Those that are bred in hot countries, standing mostly upon dry ground, have deep crusted hollow hoofs with small frogs; for, being but little exposed to wet or moisture, the fibres of the hoof contract more closely. And, even in Great Britain, there is a considerable difference, according to the dryness or wetness of the soil upon which horses are bred. Those that are bred upon the mountainous parts of England and Wales, and in the northern parts of Scotland, have generally good sound tough hoofs; whilst those horses that are bred upon low marshy grounds (which are mostly of the big draught kind), have flat, large, soft hoofs; for being kept too moist, by always soaking in wet, the horny fibres of the hoof are too much relaxed.

Those hoofs which are either too large or too small, in proportion to the size of the body, and thickness of the bones of the legs, are generally, and not without foundation, looked upon as bad. Large broad hoofs,

for

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for the most part, have thin flat soles; large, soft, spongy frogs: a strong crust, something hollow upon the upper and fore part, and full of wrinkles or rings, not unlike the rough outside of an oyster-shell. Hoofs of this shape are liable to that disease termed *fouled*; and to have high, round, or swelled soles, and low weak heels, &c.

Small hoofs are liable to the opposite extreme, especially those of that kind which generally go under the denomination of *asses' hoofs*, as they are deep crusted and narrow, the sole very hollow, the frog small, the heels high and strong, the crust upon the outside clear and shining: these are naturally disposed to a contraction of the whole hoof, which is called *hoof-bound*; and likewise to corns, running thrushes, or *frushes*; either of which render a horse lame.

Some hoofs are pretty well proportioned, and look well to the eye; but, at the same time, they are thin and weak crusted, and not able to stand much fatigue in travelling upon hard stoney grounds. On the other hand, very strong crusted hoofs are by no means the best, but are liable to cracks, &c. In such hoofs, the horny fibres appear very distinct, and run in a straight line from the coronet or top of the hoof to its basis, resembling the grain of some kinds of wood, particularly oak. Hence they are disposed to cracks or fissures, which cleave the hoof quite through, sometimes from the coronet down to the bottom of the hoof. In others, these cracks at first do not penetrate through the horn, but appear like a seam on the surface of the hoof, commonly named a *sand-crack*; which, from retaining the sand and gravel, at last works its way into the quick, and occasions lameness, &c. Another disadvantage attending very strong crusted hoofs is, that, when they stand long in a dry hot stable, they contract, and by their thickness and hardness bruise the internal parts of the foot. Hence the horse will be lame, though, at the same time, no visible defect will be seen about the hoof, excepting a great heat, pain, and tenderness in his feet; the true cause of which is seldom attended to or known; and hence the horse is said to be lame in some other part, perhaps the shoulders. Low thin heels are weak-crusted, and liable to lameness from injudicious shoeing. The opposite extreme, *viz.* very high heels, is equally bad; as these are subject to corns, and contraction of the hoof; and the deepness of the crust causes a numbness in the feet, and unsteadiness in the horse's going, which make him liable to trip and stumble.]

Much has been said by authors, with respect to the different colours of horses' hoofs, ascribing different qualities and temperaments to peculiar colours, such as hardness, dryness, brittleness, &c. But it is very well known to practitioners in shoeing horses, that there are good and bad hoofs of all colours; some being naturally weak and disposed to be brittle, whilst others are tough and strong. But a great deal depends upon the management of them in the stable, in keeping them properly moistened, in order to preserve a due medium between these opposite extremes. It is likewise generally remarked by authors, as a sure sign of bad thin hoofs, that, when the shoe-nails are drove high up in the crust, it is, say they, an evidence that the crust is thin, and that there was not sufficient hold, without driving the nails high up. But this can be no true

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criterion to judge by; for, if the nails can be driven high up in the crust with safety in a thin weak foot, the same may as certainly be done in a strong foot, with more ease and expedition, which indeed is frequently the case.

To form a right judgment of what may be called a *good hoof*, it must neither be too large nor too small in proportion to the size of the leg: at the same time, its shape must be regular, gradually enlarging from the coronet towards its basis; the crust smooth, even, and free from seams, cracks, or wrinkles; the sole strong, and a little hollow; the heels firm and open; the frog tough, sound, and dry.

SECT. XL. Wounds in the Feet.

Wounds in the feet happen frequently, but chiefly from want of proper care, and treating them injudiciously when they are first inflicted.

1. Wounds upon the coronet, or top of the hoof, when superficial, are easily cured, if not neglected or improperly treated. But the most simple wound, by bad management or neglect, may, especially if the horse should happen at the time to be in a bad habit of body, be attended with dangerous consequences: therefore, however trifling they may at first appear, they should be treated with attention.

When large deep wounds are inflicted upon the coronet, from which may be apprehended a great inflammation, and its consequences; to prevent these evils as much as possible, it will be necessary to have recourse to bleeding, and, at the same time, to give such internal remedies as are recommended in inflammatory cases; cooling salts, glysters, &c. together with a low soft diet, keeping the hoof moist and soft with emollient poultices applied around it, which may be made of turnip, mallows, or even bran and water.

Deep wounds upon the coronet are generally made by long sharp caulkers upon the heels of the shoes of the opposite foot, penetrating downwards between the coffin-bone and the hoof. In this case, as there is no depending orifice or passage for the matter contained in the wound to be discharged downwards, there is great danger of a fistula or sinuous ulcer being formed; to prevent which, an artificial drain or opening must be made through the hoof, first rasping or paring it very thin upon the outside where the perforation is to be made; then introduce a sharp-pointed instrument, a little bent, into the orifice of the wound, and, passing it to the bottom, force it outwards. This operation will be performed with less pain to the animal, if the instrument be concealed within a canula or hollow tube, till it reaches to the bottom of the wound; when the perforation is to be made by pushing it beyond the extremity of the canula; and, by applying a bandage pretty tight round the coronet, the sides or lips of the wound may be brought into contact and healed up, or a seton may be introduced, and continued till the inflammation, swelling, &c. are removed. If this operation be too long delayed, the matter confined in the wound forms a number of sinuses or fistulae, which frequently run in different directions under the hoof, and require a large portion of it to be cut away before they can be healed up, leaving an ugly blemish, and a weakness or tenderness on that part of the hoof, which never admits of a thorough cure. But, by

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by treating it in the manner now mentioned, the annular ligament may be preserved entire, and a false quarter avoided: and, although there may remain an horizontal crack or fissure in the hoof where the perforation was made; yet, as the hoof grows downward, it will likewise go along with it, and wear out, without leaving a blemish or any other bad consequence.

When the capsular ligament of the coffin-joint is wounded or perforated by any instrument, so as to admit the external air into its cavity, the glands there situated inflame; and, in place of secreting a lubricating mild liquor, they discharge a sharp ichorous fluid, which destroys and corrodes the very cartilages or gristles upon the ends of the articulated bones, which at last grow together, and form what is termed an *anchylosis*, and of course lameness. There are many farriers who boast of their having cured wounds in the joints after they were affected with that symptom which they call a *joint-water*, that is, a discharge of the synovia or mucilaginous fluid contained within the cavity of the joint. But what they commonly call a *joint-water*, is only a yellow serum or lymph, which is frequently to be met with issuing in great abundance from wounds in the legs; and not the synovia or fluid contained within the cavity of the joint. Notwithstanding wounds of this kind happen frequently; yet, so little are the generality of practitioners acquainted with the nature of them and their consequences, that they make no distinction betwixt them and those of a more simple nature. Hence, therefore, they find themselves frequently mistaken in prognosticating the cure of a wound, to appearance of a very simple nature.

It is a certain fact, confirmed by experience, that, when the capsular ligament of any joint is perforated or cut through, there is but little chance of a complete cure being effected, so as the horse may be useful for the saddle or carriage; although, in other respects, to those who are willing to be at the expence, he may, if a strong horse, be useful in some kinds of drudgery.

As to the mode of dressing wounds of this kind, all that art can do, is to prevent, as much as possible, a violent inflammation or flux of humours to the affected limb, by bleeding, glysters, cooling salts, together with a low soft diet, applying digestive poultices to the wound, and injecting now and then into the cavity of the joint tincture of myrrh.

2. Wounds upon the coronet towards the back part of the foot or heel, which are commonly called an *over-reach*, are occasioned by the toe of the hind-shoe on the same side cutting the fore-heel. Some horses are much addicted to this, owing entirely to their manner of going, viz. the hind-foot moving in the same line of direction with the fore-foot; in riding fast, the fore-foot not giving place in time, the hind-foot strikes against the fore-heel: hence some horses, in trotting, make a clattering noise with the hind-shoes striking against the heel of the fore ones; hence, likewise, many horses are thrown down by the same cause.

Although an over-reach is a wound of the complicated kind, being at the same time a contusion or bruise together with a wound; yet they are nowise dangerous, and are easily cured by treating them in the man-

ner hereafter mentioned; for, in two or three days, when the wound comes to suppurate properly, the bruised or dead parts fall off, and only leave a larger surface of a wound than was at first apprehended.

With respect to the dressing proper for recent wounds, farriers are too much prejudiced in favour of certain balsams, ointments, and tinctures; and too sanguine in the belief of their supposed specific virtues, the healing qualities of which they flatter themselves are irresistible. But the truth is, all that art can do in the healing of wounds, is to remove every impediment which may obstruct the uniting of the divided parts, and to forward the formation of laudable pus or matter; that being once effected, the rest is performed by nature, which is self-sufficient. All the balsams and remedies which are said to generate new flesh, in fact only assist nature by excluding the external air, keeping the wounded parts warm, and confining the secreted humours, which, by remaining there a due time, are converted into laudable matter, which is the balsam of nature's preparing. Therefore, the most approved and rational method of treating recent wounds is, to endeavour to bring them to a suppuration or discharge of laudable matter; for which purpose, poultices are most eligible, as they may be easily made more or less of a digestive quality, by melting and mixing any proper digestive ointment with the poultice whilst warm.

Digestive ointment. TAKE common turpentine and hog's lard, of each equal parts, melted together.

This ointment may be made stronger or weaker, by diminishing the one ingredient and increasing the other; and is very proper to be mixed with poultices, in order to keep them soft and pliable.

Digestive Poultice. TAKE oat-meal or coarse wheat-flour; digestive ointment, two ounces; beer-grounds, a sufficient quantity: boil the whole to the consistence of a poultice. The quantity of the ointment may be increased or diminished in proportion to the size of the poultice.

The experience the author has had of the good effects of poultices of this kind in recent wounds, makes him recommend them as preferable to any other mode of dressing, for promoting a quick suppuration, and leaving a smooth even cicatrix.

3. *Emollient Poultice.* TAKE oat-meal, or coarse flour, and linseed powdered, of each half a pound. Boil them in milk or water to the consistence of a poultice: to which add of sal ammoniac, in powder, one ounce.

This emollient poultice may be applied when there is a great heat, inflammation, or swelling, attending wounds; and by the addition of fresh butter, lard, or oil, may be made of a more relaxing nature.

Many people are indeed prejudiced against the use of poultices, from a wrong notion, that they (as the phrase is) draw humours to the wounded part; but the absurdity of this way of reasoning will be evident to those who are acquainted with the healing art.

"Poultices (says Mr Bartlett) are of such real and extensive use in farriery, that we thought the composition of them could not be too general. How simple soever the ingredients may appear to some (which are generally at hand), yet they will be found to answer most

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most intentions, where present ease is to be obtained by warmth, softening, and relaxing the injured part. Many are the cases which demand such assistance, as recent swellings, inflammations, treads, bruises, cracked and swelled heels and feet, burns, scalds, bruised and lacerated wounds from stumps, thorns, glass, nails, &c. which last are much better treated with such simple emollient applications, than by hot oils or scalding plasters dropt into the wounds; which, under the absurd notion of drawing, but too often fear up the mouths of the vessels, hinder digestion, and consequently increase both pain and inflammation. In short, it is certain that very great services are daily done by the use of poultices, not only in those disorders to which the human body is incident, but also in those where-with the brute part of the creation is afflicted. One advantage which they have over most outward applications is peculiar to them, that they convey and retain an additional heat, besides what is often in the ingredients; and as most of them have also something emollient in their composition, they must necessarily soften and relax the skin and vessels, abate tension, attenuate and thin viscid and obstructed juices, so that their return into the common course of circulation, or discharge by the pores of the skin, must in general be much better answered by poultices than by other methods."

Poultices may be continued till such time as the wound appears to be well digested (that is, a kindly suppuration of white well-concocted matter), look smooth and equal, free from cavities or excrescences of proud flesh; in that case, the use of poultices may be left off, and the surface of the wound may be sprinkled over with the following mild escharotic powder.

TAKE burnt limestone, that breaks down on being exposed to the air without water, three ounces; Armenian bole, one ounce; rubbed together in a mortar, and put through a fine sieve.

After the wound is sprinkled with this powder, a pledget of dry lint may be fixed gently over it; and, when the surface of the wound is nearly equal with the skin, the powder will be sufficient, without any cloth or covering.

3. There is another species of wounds to which the feet are much exposed, called *punctures*, on account of their small orifice, as the parts immediately after the wound is inflicted readily close up, whereby it becomes difficult to know the depth of the wound. They are generally occasioned from treading upon sharp stones, broken glass, sharp bones, and nails, and likewise from nails in shoeing; either of these perforating the sole or frog, and wounding the internal parts of the foot; which, from their situation and confinement within the hoof, are attended with the most violent pain and inflammation, which are frequently increased by the injudicious method generally observed in treating these wounds when first inflicted, by the application of hot corrosive oils poured into the recent wound, in order to deaden it, which is productive of the worst of consequences. Thus, a fine young chaise-horse, upon a journey, was pricked with a nail in shoeing; which being immediately observed, the farrier poured into the wound oil of vitriol. The horse continued very lame; and, upon the third day, he gave up, not being able to travel any longer. The leg, immediately above the

hoof, swelled to a most enormous size, broke out in different places, and discharged an incredible quantity of bloody matter, by which the whole limb was wasted, and the horse rendered entirely useless.

Punctures or pricks from nails in shoeing, are commonly said to proceed from ignorance or blundering. This may sometimes be the case; but, at the same time, it is an accident that may, and indeed does, happen to the most expert artist; and it is surprising, considering the narrow space there is in some hoofs for driving nails, that it does not happen more frequently. When it is discovered in time, it is easily cured, by opening a passage for the matter downwards, and dressing it with any digestive ointment or poultice, and keeping the foot moist, by applying an emollient poultice all round the hoof. But when it is overlooked, or a fragment of the nail remains in the wound, the inflammation increasing, it at last suppurates. The matter accumulating, and not finding a passage downwards, from the natural formation of the hoof, it moves upwards to the coronet or top of the hoof, and forms a round tumour, which afterwards breaks out and degenerates into a most malignant ulcer, commonly termed,

4. A *Quittor-bone*. This tumor is attended with great pain and inflammation, and a considerable swelling round its basis. The method of cure commonly practised, and indeed recommended by authors, especially Dr Braken, is to bore a number of holes into the substance of the tumor with a hot iron, pointed pyramically; and to introduce into these holes small pieces of corrosive sublimate (some even use arsenick), which corrodes and destroys the flesh for some space around them, and at last separates from the sound parts, in a hardened mass of dead mortified flesh, called a *core*, which falls off and leaves a large surface of a wound. But, frequently, a second or sometimes a third operation is found necessary, before the fistula or sinus can be opened to the bottom, and the proud flesh totally overcome, which grows very luxuriantly, and renders the cure tedious, uncertain, and very painful to the animal. Therefore, as this method of cure is attended with so many inconveniences, and is even dangerous from the quantity of sublimate, &c. made use of, which may as readily destroy the ligament of the joint, bones, &c. as the substance of the tumor, it ought never to be used but with caution, and when other means have failed, as it likewise endangers the life of the horse. The knife seems far preferable: first tie a ligature round the fetlock, in order to stop the bleeding; and, with a crooked sharp knife, cut out the tumor to the bottom; afterwards dress it like a fresh wound till it is healed up.

In ulcers of this kind, as there are a number of sinuses or fistulae which run in different directions underneath the hoof, it is hardly possible to avoid destroying the annular ligament which lies below the coronet, and cutting away a large portion of the hoof; yet, in many cases (especially when there is an opening in the tumor), the method proposed, at the beginning of this section, for curing the deep wounds upon the coronet with seton, may be first tried; and, if that does not succeed, either of the operations above mentioned may be performed.

Punctures differ little or nothing, in the manner of treating

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treating them, from wounds; only the sole or frog should be scraped thin all round the orifice of the wound; which, at the same time, if too small, should be enlarged, and the digestive poultice applied, taking care that no fragment or extraneous substance remain in the wound, and keeping the whole hoof moist and soft with emollient poultices around it; and, in cases attended with violent pain, recourse must be had to such internal remedies as are proper in inflammatory cases, such as the following mixture by way of a drink, in order to prevent, as much as possible, an inflammation, or a flux of humours to the afflicted limb, bleeding being first premised, together with using a low soft diet.

TAKE salt of nitre, two ounces; common treacle, two ounces. Dissolve in a quart of water.

It will be necessary to repeat this draught morning and evening; if the horse should show any uneasiness, or appear griped, the quantity of water may be increased, or the same quantity of nitre may be given the horse in a mash of bran twice a-day, if it does not cause him loath his food. If the coffin-bone should be wounded and turns carious, it will be tedious to wait for an exfoliation, as, from the spongy texture of this bone, it exfoliates but slowly: therefore, if it can conveniently be done, the carious parts may be scraped off with a knife, and afterwards dressed with pledgets of tow dipped in the tincture of myrrh; and let the poultice be applied above it.

In punctures, as above described, it is a common practice to pour into the wound hot corrosive oils (some even run into the wound an iron nail made red hot), in order, as the phrase is, to deaden the parts. In superficial or slight wounds, when perhaps little more than the hoof is wounded, the application of hot oils can hardly be very hurtful: but the barbarous method of pushing a hot nail into a recent wound, cannot fail of being attended with bad consequences, as the cure is unquestionably worse than the disease. But, at all events, when the puncture is deep, either of these cruel methods is extremely hurtful. The wound is said to be of the most inveterate or desperate kind; when, in fact, the bad practice of injudicious applications, &c. escape the just censure they deserve.

5. *Contusions or bruises* happen frequently on the coronet or top of the hoof, from the treading of other horses feet, which will occasion lameness; although, at the same time, no external mark of violence will appear on the coronet farther than a little swelling, or the horse will show a sense of pain when the affected part is touched or pressed upon. The following poultice in this case may be applied with success, if continued for some time.

TAKE thick lees of wine or vinegar, one pint; crude sal ammoniac, two ounces; oat-meal or bran, sufficient to make it of a due consistence. Dissolve the sal ammoniac in the lees first.

Before concluding this section, it may not be improper to mention the following rules, which ought carefully to be attended to by every practitioner. 1. The first thing to be observed in dressing of wounds is, to remove all foreign bodies (if it can be done with safety), all lacerated or torn parts, whether of the flesh or of the hoof, &c. which, from their being left in the wound, would greatly impede the cure. 2. All

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wounds should be carefully inspected at every dressing, observing attentively whether any alteration has been made on their surface, whether they be clean at the bottom, and free from any extraneous substance that may hinder or retard the cure. 3. Whatever appears mortified, or any fungous or proud flesh, must be removed, either by suppuration, by the knife, or by caustic. 4. Cramming wounds with hard tents, or syringing them frequently with spirituous tinctures, are extremely hurtful. The former increases the pain and inflammation, &c. the latter produces a callus upon the internal surface of the wounds, which prevents their healing. 5. The dressings of wounds should lie smooth and easy upon the parts. 6. Over-tight ligatures or bandages should be carefully avoided. 7. As wounds in the feet or legs, for obvious reasons, are more difficult to heal than on any other part of the body; therefore, rest and a wide stall are absolutely necessary, together with a low regimen or soft diet, in order to keep the body cool and open.

SECT. XLI. *Of that Disease in the Feet commonly called FOUNDERED.*

THE term *foundered* is frequently applied to lame horses in a very vague manner, and without any determined or fixed meaning: for, when a horse shows any defect or impediment in moving his fore-feet, he is then pronounced to be foundered, whether he really has been so or not; that is, according to what is commonly understood by that term, owing to the want or neglect of not making proper distinctions of the different diseases in the feet. If we consult authors who have treated upon this subject, we shall find their accounts of it very dark and imperfect; they bewilder the reader, and convey but a very indistinct idea of the nature of the disease: hence many errors are committed in practice, to the destruction of a number of valuable horses, which otherwise, by proper management, might have been rendered sound and useful. When a horse is first attacked with this disorder, he shows a great restlessness, is hot and feverish, heaves much at the flanks, breathes quick, has a quick strong pulse, and groans much when moved about; at the same time, he shows symptoms of the most violent pain, sometimes in one, but more frequently in both fore-feet; for which reason, he lies down much; but, when forced to move forwards, he draws himself together, as it were into a heap, by bringing forward his hind-feet almost under his shoulders, in order to keep the weight of his body as much as possible from resting upon his fore-feet. In stepping forward, he sets his heel down first with great caution, as afraid of touching the ground. This last symptom should be particularly attended to, as from it we may conclude with certainty that the chief seat of the disorder is in the feet. The hoofs at the same time are exceedingly hot; and, if water is thrown upon them, they dry instantly: if an attempt is made to pull off any of the shoes, the horse shows great uneasiness upon the least twist or pressure made upon any part of the foot, and a great unwillingness to support the weight of his body upon the other foot, especially when they are both alike affected.

It is universally allowed, that the cause of this disease proceeds from too violent exercise, such as riding very

Foundered. very hard upon stony grounds or turnpike roads, and that young horses are most liable to it; and to these we may likewise add, unequal pressure upon the internal parts of the foot, from the concave or hollow form of the common shoes. All these causes combined together, when a horse is of a plethoric or full habit of body, and not accustomed to violent exercise, occasion this disease in a greater or less degree. To form some faint idea of this malady in horses, we may in a great measure appeal to what we experience ourselves in running upon hard ground; for we find, that it occasions a great heat, attended with a smart pain in our feet, which would be greatly increased from uneasy shoes, especially if compelled (like horses) to continue the running for any considerable time. The feet likewise become turgid and painful after a long day's journey, especially if the person is not accustomed to travel; and this inflammation frequently terminates in blisters upon the soles of the feet. Hence it is evident, that, in proportion to the habit of body the horse is in at the time, and the violence of the labour or exercise he has undergone, the inflammation in the internal parts of the foot will be more or less violent, and attended with all the symptoms already mentioned.

This disease, then, appears from the symptoms attending it, and the effects it afterwards produces in the feet, to be, in its first stage, an inflammation of the internal parts of the feet, arising from the violent exercise, which occasions a more than ordinary determination of the blood to the feet: hence that rapid circulation of the blood in the vessels within the hoof, which frequently terminates in a rupture of these vessels, and of course an extravasation of the blood, and, in some cases, a total separation of the horny substance of the hoof from the aponeurotic fibres upon the fore part of the coffin-bone; whilst in others, where it has been less violent, a concretion or growing together of the parts within the hoof has taken place, so as to appear upon dissection one solid mass; and hence lameness.

Thus, a young chaise-horse, after a hard day's work, was attacked with all the symptoms already mentioned, and was treated in the common manner as above related, that is, rowelled, &c. In a few weeks after the disease had taken its course in the ordinary way, he was put under the author's care. The sole, a little before the point of the frog, in one of his fore-feet, became soft; and having a curiosity to see the cause of it, the author cut away the sole, which was but thin, and found a cavity containing a reddish coloured liquor: after removing the ragged parts of the hoof, a large transverse opening showed itself, into which a probe was introduced upwards between the coffin-bone and the hoof; the connection between the tendinous fibres upon the surface of the coffin-bone and the hoof was destroyed at the fore-part or toe; the bone, losing part of its support, pressed down upon the horny sole, and produced that swelling or convexity of its surface, which is called a *high, round, or pumice sole*. The hoof lost its former shape, growing narrow towards the toe, with a preternatural thickness of the horny substance of the crust, whilst the quarters or sides of the hoof were decayed, thin, and full of deep wrinkles, together with a hollowiness upon the surface

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of the upper part of the hoof, the whole foot having a diseased appearance. When the horse had recovered so far as to be able to walk, in going forward he threw out his legs well before him, but drew them backwards before he set his foot to the ground; setting the heel down first with great caution, upon which he rested most, the toe being turned a little upwards. From this symptom only, we may judge with certainty, even though at a distance, upon seeing a horse walk, whether he has ever been foundered or not.

This disease proves still more violent, and indeed sometimes fatal, if the horse has been allowed to stand in cold water when his feet are overheated. Thus, a saddle-horse, after being rode very hard, was turned loose into a stable-yard all over in a sweat; he went immediately into the water-pond, where he was suffered to stand for a considerable time in very cold weather: a few hours afterwards, he was seized with a most violent fever, and a great pain in his fore-feet: he lay upon the litter for some days in the greatest agony; and at last both his hoofs dropt off, occasioned by a mortification brought upon the parts from the application of the cold water, which rendered him entirely useless.

From what has been said with respect to this disease, it is evident, that as the circulation is greatly increased, and the current of blood chiefly determined towards the fore-feet, attended with symptoms of the most violent pain, we may thence conclude, that there is an inflammation in these parts: therefore, the cure must first be attempted by diminishing the circulation of the blood, giving cooling salts internally, glysters, an opening diet, and plenty of diluting liquor four or five times a-day, together with emollient poultices applied warm all round the hoofs, in order to soften them, and keep up a free and equal perspiration; observing, that his shoes be easy upon his feet; but by no means to pare the sole or frog to that excess which is commonly done in cases of this kind, farther than cleaning away the hardened surface of the sole and frog, in order that the poultice may have the desired effect, by increasing the perspiration through the pores; and to avoid all manner of greasy or oily applications to the hoofs, for the reasons already mentioned.

In all violent inflammations, there is nothing which contributes more to give immediate relief, than plentiful bleeding timeously performed; and which ought by no means to be neglected, or too long delayed: for, in cases of this nature, although the fever may be so far overcome by strength of constitution, or prevented by medicines from destroying the life of the animal; yet the effects of it will ever afterwards remain, and, of course, the horse will be lame for life. But, in order to judge properly when this operation may be necessary, the pulse must be attended to, the knowledge of which is of the utmost importance in the practice of farriery, and should be more generally studied, as it is the only criterion or rule by which we may be directed when bleeding is necessary, or when it ought to be avoided. But when this operation is neglected, and the cure is first attempted by rowels, &c. it is a long time before they can come to a proper suppuration, on account of the violence of the fever. Hence, in place of suppurating, they sometimes turn

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into a gangrene, by which many horses lose their lives. But, at all events, before the rowels could have any effect, even allowing they were to suppurate in the common time (which is about three days), the inflammation within the hoof will by that time have taken place; and its consequences will follow, to the ruin of the feet, and, of course, the loss of the horse.

The manner in which a horse walks or stands upon his fore parts, when affected with this disorder, has induced many practitioners, &c. to conclude, that the shoulders are affected: hence they say a horse is foundered in the body; and that drains, such as rowels, are the only proper remedies. But granting there was a stiffness, &c. all over the body, which is frequently the case in the beginning of inflammatory fevers, bleeding ought to be premised, as the first necessary step towards the cure.

SECT. XLII. *Hoof-Bound.*

THIS complaint affects the hoofs differently, according to their natural shape, and the treatment they are exposed to, whether from injudicious shoeing, keeping the hoofs too hot and dry, or paring the sole and binders at every time they are shod. Some are affected with a circular contraction of the crust, compressing the whole foot. In others, the crust is contracted at the coronet only, compressing the annular ligament, &c. A third kind is, when either one or both heels are contracted: hence, therefore, in proportion to the degree of contraction, the internal parts of the foot are compressed, and the horse becomes more or less lame.

It has been already observed, SECT. xxxix. that deep-crufted narrow hoofs, or what are commonly called *asses hoofs*, are naturally disposed to this malady: when they become diseased, they are easily known from their appearance, as they are smaller in proportion than the legs, and frequently smaller at their basis than at the coronet; the crust of the heels is high, thick, and strong; the frog wasted and rotten; the hoofs are almost perpendicular; the horse moves in pain, steps short and quick, and trips and stumbles frequently; it is not uncommon that one foot only is affected, which then appears considerably smaller than the other.

This disease is hastened and brought on by paring and hollowing out the sole and binders at every time the shoes are renewed, from a mistaken notion of widening the heels; hence they are thereby made so very thin, that the crust at the extremity of the heels may be forced almost close to one another even with one's fingers: and what greatly forwards the complaint, is the form of the shoes commonly used, which are made hollow; for this practice of hollowing the shoes so universally prevails, that, without any regard to the shape of the sole, whether it be flat or otherwise, the shoe is made concave or hollow upon that side which is placed next the foot. Hence the outer edges of the concave shoes force the crusts at the heels nearer to one another; which being there retained, the contraction of the hoof becomes general, and confirmed beyond the power of art or remedy.

In the second species of this complaint, the hoof acquires a particular shape, which Mr Gibson, in his Farriery, compares to that of a bell; that is, the hoof appears contracted and tight round the coronet and

inlept, but spreads wider downwards to its basis; the hoof in other respects looks well and sound. This is generally occasioned by keeping the horse standing for a long time together in the stable upon hot dry litter, without moistening and cooling the hoofs, allowing them at the same time to grow to a preternatural size both in length and breadth: hence, from the great strength, the rigidity and dryness of the under part of the hoof, a preternatural stricture or pressure is made by the hardened crust at the coronet, which compresses the annular ligament and parts near it.

The third species of this malady is, when either one or both heels are contracted. This frequently happens even in all kinds of hoofs, but more especially in those that are flat, from the use of concave or hollow shoes, together with cutting out the sole and binders at every time the horse is shod. But it more frequently happens, that the inside heel only is contracted, from the natural weakness of that part of the hoof: hence the weight of the limb, &c. pressing upon the inside crust at the heel, it is infected or bended inwards; by which, together with the concave form of the shoe, and loss of substance from paring, &c. the disorder is increased, the crust of the heels becomes contracted, and compresses that quarter of the foot, and of course occasions lameness.

With respect to any particular method of cure to be observed in removing this disease, all that can be said is, That, as it is one of that kind which comes on gradually and perceptibly, it may by proper care and management, when properly attended to, be prevented. But when once it becomes confirmed, it never will admit of a thorough cure. Nevertheless, it may be so far palliated as to render a horse in some degree sounder, by keeping the hoofs cool and moist; as, in this case, they are naturally disposed to be very hot, dry, and hard, his shoes should be flat, narrow, and open heeled, the hoofs never greased nor oiled, the soles never pared. But as the crusts of the heels in these hoofs are preternaturally high and strong, they should always be pared down till they are lower than the frog, that it if possible may rest upon the ground. This operation will tend to remove that stricture from the heels and frog, which will greatly relieve them. But many people, adhering too strictly to that general rule, which from inattention has crept into practice, *viz.* of paring down the toes, and keeping the heels entire, without reflecting upon the shape or natural formation of the particular hoofs, continue the same practice upon deep-crufted, high-heeled hoofs, which is only necessary to be observed in long-toed hoofs with low heels, and thereby this disorder is greatly increased; the weight of the body is likewise thrown forwards, by which the horse stands too much upon his toes; and hence the leg-bones, from the awkward habit of the horse's standing, become bent at the joints, and occasion what is called *knuckeling* or *nuckeling*.

The second species of this complaint, is when the crust at the coronet becomes contracted; and compressing the annular ligament, &c. occasions lameness, the hoof acquiring that shape formerly compared to that of a bell. Different methods have been tried and recommended for the cure. Mr Gibson proposes to make several lines or rases on the fore-part of the hoof with a drawing knife, almost to the quick, from the coronet

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bound.

down to its basis, and turning the horse out to graze: others, after this operation is performed, screw the heels wide, by means of a screwed shoe: a third method practised is, to draw the sole, and divide the fleshy substance of the frog with a knife, and keeping it separated by the screwed shoe above mentioned: a fourth method in use, is to make the inner-rim of the shoe-heel very thick on the under side (its upper surface being quite flat); and by making it rest upon the binders and sole at the extremity of the heels, by pressure from the weight of the body, the heels are forced to recede to a greater distance from one another. Either of these methods may indeed in a small degree widen or expand the horny substance of the crust, and may be of use in recent contractions. But when once it has become confirmed, and is of some standing, no means whatever can then restore the internal parts to their primitive state; for as the contraction takes place, the tender parts within the hoof being compressed, lose their tone, and diminish in their size. The blood-vessels become impervious; hence a decay or wasting of the whole foot, and not unfrequently a concretion of the parts, and of course the impossibility of the horse ever becoming sound. But as it has been observed, that the cause of this species of the complaint now under consideration proceeds from allowing the hoofs to grow to an extraordinary size, and keeping them too hot and dry, by which they acquire a rigidity and dryness, occasioning a preternatural compression upon the coronet; to remove which (as the case will only admit of palliation), the surface of the hoof at its basis must be pared down till the blood appears, the thick strong crust upon the outside towards the toe rasped in the same manner, and the horse turned out to graze in soft meadow-ground till the feet recover. But it must be observed, that if both hoofs are alike affected, one of them at one time only should be treated in the manner directed, as a tenderness will remain for some days, which might prevent the horse from walking about in search of food.

The third species is a contraction of one, or sometimes of both heels, in flat feet, from the use of concave shoes, &c. Where it has not been of a very long standing, it may, by proper management, be greatly relieved, by laying aside the use of concave shoes, and refraining from paring the sole, &c. But to remove the stricture of the hoof more immediately, the whole contracted quarter of the crust near the heel must be rasped or pared to the quick, from the coronet to its basis, close to the frog, taking care to avoid drawing blood, putting on a barred shoe, causing the shoe-bar to press upon the frog, keeping the hoof cool and moist, or turning the horse out to graze. Hence the pressure from the contracted hoof being removed, and the frog at the same time resting upon the bar of the shoe, the contracted quarter is thereby dilated or expanded: the new hoof growing from the coronet downwards, acquires a round, full shape; and becomes of its original form.

From what has been said concerning this disorder in the feet of horses, it is evident, what little prospect there is of effecting a thorough cure by art, as the complaint is of such a nature as only to admit of some palliation, and even then in some very favourable cases only. Nevertheless, it is practicable to prevent

contractions in the hoofs from taking place, even in those hoofs which are seemingly disposed that way from their shape, &c. by observing the rules already laid down, viz. by keeping the hoofs moist and cool, which is their natural state; using flat shoes, from which the hoofs can acquire no bad shape; allowing the sole and frog to continue in their full strength, the latter especially to rest upon the ground; and keeping the crust within due bounds, not suffering it to grow too long towards the toe, nor too high at the heels.

SECT. XLIII. *Of Corns.*

In the human body, corns in the feet are termed so with some propriety, from their horny substance; but what are called *corns* in the feet of horses, are very improperly named, as they are quite of an opposite nature, rather resembling contusions or bruises, and not unlike those bruises which happen in the palms of the hands and fingers to working people, arising from violent pinching, bruising, &c. where the skin is thick, which appears of a blackish red colour, and exceedingly painful at first, containing blood; but in the end, the serum or thinner parts being absorbed, the red particles appear when the dead skin is removed, like red powder. In like manner corns, or rather bruises, appear red and *soxy*, as the phrase is. They are situated in the corner or sharp angle of the sole at the extremity of the heels, where the crust reflects inward and forward, forming the binders. But they are more frequently to be met with in the inside heel, from the manner of the horse's standing, together with the pressure or weight of the body, which is greater upon the inside of the hoof than the outside. Bruises of this kind are exceedingly painful, inasmuch that the horse shrinks and stumbles when any thing touches or presses upon that quarter of the hoof; hence lameness.

This complaint arises from different causes, according to the shape or natural formation of the hoof, together with the treatment they are exposed to. But the following are the most frequent.

1st, In flat low heels, from too great a pressure of the shoe-heel upon the sole, whether from *caukers*, a too great thickness of iron upon the heels of the shoe, or its being bended downwards upon the sole, or the shoe made too concave; either of these causes will produce the same effect: for, from the too great pressure upon the horny sole, the fleshy sole, which lies immediately underneath it, is compressed and bruised between the shoe-heel, the sole, and the extremities or outward points of the coffin-bone; and hence a contusion or bruise, attended with an extravasation of the blood, which afterwards gives that part of the sole a red appearance, and is the reason why the sole on that place never grows up so firm and solid as it was before, but remains soft and spongy, forming a lodgement for sand and gravel, which frequently insinuates itself into the quick, causing an inflammation, attended with a suppuration or discharge of matter, which, if not finding a passage below, will break out at the coronet.

2^d, This complaint is produced in wide open heels, when the hoofs are very thick and strong, from too great a luxuriance of the binder, which, being inflected or bended downwards between the shoe and the

X 2

sole,

Corns.

sole, compresses the fleshy sole, as already mentioned; and hence lameness.

3d. This malady, in deep narrow hoofs, proceeds from a contraction of the crust compressing the heels, &c. Hence, it not unfrequently happens in hoofs of this shape, that both heels are alike affected, from the stricture and pressure of the hardened crust upon the tendinous aponeurosis, &c. on the outside of the coffin-bone, which in this case is bruised between the bone and the crust; hence the redness may sometimes be traced upwards almost to the coronet. In this case no radical cure can take place, as the cause which produces these bruises, &c. will exist while the horse lives, and at the same time the horse will be lame from the contraction of the hoof; but the remedy proposed in the preceding section, by way of palliation for hoof-bound feet, may be of use to render the horse in some measure more serviceable.

With respect to the two first causes, when the bruise proceeds from too great a pressure from the shoe-heels, &c. upon the sole, the shoe must be made so as to bear off the tender part, and likewise to some distance on both sides of it; for which purpose, a round or a barred shoe will be necessary. The red and bruised parts must be cut out to the quick, and the hoof kept soft with emollient poultices for some time. But the texture of the blood-vessels, and likewise that of the hoof at the bruised part, being destroyed, a sponginess remains afterwards, and upon the least unequal pressure from the shoe, &c. are liable to a relapse, never admitting of a thorough cure, and of consequence subject to frequent lameness.

Corns or bruises in the feet of horses might, by taking proper care of them, be easily avoided: for in those countries where horses go mostly barefooted, this malady is not so much as known; neither are those horses that go constantly at cart and plough subject to them: hence, therefore, this complaint is most frequently to be met with in great towns, where horses go much upon hard causeway, having their shoes turned up with high caulkers on the heels, and frequently renewed, at the same time their hoofs being kept too dry and hard, from standing too much upon hot dry litter: hence will appear the necessity of complying with what is most natural to the hoofs of horses, namely, coolness and moisture, together with using such a form of shoe as will press equally upon the circumference of the crust, and without giving it any bad unnatural shape. See sect. xlvii.

SECT. XLIV. *Of Running Thrushes.*

1. A RUNNING THRUSH (or FRUSH), is a discharge of a fetid, and sometimes ichorous, matter, from the cleft in the middle of the frog, affecting one, frequently both, and in some cases all the four feet. But, generally, the fore-feet are most subject to this disease. In most cases, it seldom admits of a radical cure; but is subject to frequent relapses, occasioning lameness, from the rawness and tenderness of the parts affected, on being exposed to sand, gravel, &c. or in rough ground, from the heels trading on sharp stones, &c. and when the horse happens to be of a bad habit of body, they even degenerate into what is commonly called a *canker*.

Running thrushes, according to Mr Gibson, "are

sometimes profitable to horses of fleshy and foul constitutions; because (says he) they drain off a great many bad humours." But however salutary or beneficial they may be in some particular constitutions, yet, upon the whole, they prove extremely troublesome, on account of the lameness and tenderness of the feet affected with them; and, where there occurs one case in which they may properly be said to become beneficial to the constitution, there are a far greater number in which they are hurtful, as they are brought on by the treatment the hoofs are exposed to, together with the injudicious method generally observed in shoeing them, particularly in those hoofs that are narrow-heeled, or disposed to be hoof-bound, running thrushes being always an attendant upon that complaint. But, to explain this more particularly, there is, in the middle of the frog, a cleft or opening, by which the heels in a natural state have a small degree of contraction and expansion, especially when the horse treads or presses his heel upon the ground, the frog then expands; when, therefore, a horse is shod with concave or hollow shoes, the heels are deprived of that power of expansion, being constantly confined in a contracted state by the resistance from the outer edges of the concave shoe, by which the frog is pressed or squeezed on both sides, by the crust of the heels being brought nearer to or almost into contact with one another. Hence pain, inflammation, an obstruction of the blood, &c. (in the fleshy substance of the frog), and of course that wasting and rottenness of its external covering, which, falling off in pieces, leaves the quick almost bare: the new frog, growing in detached pieces, never acquires the solidity of the former; and hence that rawness and tenderness which ever afterwards remain, and that extreme sensibility of pain when any hard substance touches that part of the foot, and of course subject the horse to frequent lameness. There are, no doubt, other causes which may be said to occasion this malady, even in those hoofs that are wide and open at the heels, where there is not the least appearance of a contraction at the heels: but these are generally owing to the treatment the hoofs are exposed to in the stable, by keeping them too hot and dry for a long tract of time together, during which the natural perspiration is greatly obstructed, by the constant application of grease or oil to the hardened hoofs, and stuffing them up with hot, resinous, and greasy mixtures, as tar, turpentine, &c. the horse being all the while kept at full feeding, and not having proper and necessary exercise to promote the circulation of the fluids, and to forward the ordinary secretions, &c.: the legs swell and inflame; at last a running in the frog appears; and hence this discharge is said to be beneficial to the constitution, when in fact it is but too frequently brought on by a slothful neglect, and kept up by bad management. Fresh air and regular exercise are essentially necessary towards preserving horses in an active healthy state; for running thrushes, like other diseases to which pampered horses are subject, are not known in those countries where horses run at large in the fields; neither are they so frequently to be met with in the country amongst labouring horses, whose exercise is regular, and whose hoofs are much exposed to coolness and moisture, the natural state of the feet of horses.

With respect to the cure of running thrushes, it has been

Running Thrushes.

Running
Thrushes.See sect.
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been hinted, that in most cases, especially where it has been of long standing, affecting all the frogs more or less, it is impracticable to eradicate it by any assistance from art. For instance, when it proceeds from contracted narrow heels in those feet which are said to be hoof-bound, it is then an attendant only on that disease; and therefore cannot be cured without removing the first cause, though then it will only admit of some small degree of palliation *. But in those hoofs which are wide and open at the heels, where the complaint is recent, one or both the fore-feet only being affected, and where there is reason to suspect that it proceeds from the use of concave or hollow shoes, or keeping the hoofs too hot, dry, and hard, the cure then may be completed with ease and safety, by laying aside the use of concave shoes, washing the frogs clean after exercise, and dressing them with Mel Egyptiacum, made as follows.

Mel Egyptiacum. Verdegris in fine powder, two ounces; honey six ounces; vinegar four ounces; boil them over a gentle fire till they have acquired a reddish colour.

Or a solution of blue vitriol.

Solution of vitriol. Blue vitriol powdered, one ounce; water, one quart:

keeping the hoofs cool and moist. But, at the same time, recourse must be had to internal remedies by way of revulsion, as purging or diuretic medicines, bleeding being first premised: if the former is made choice of, twice or thrice will be sufficient, repeated at proper intervals; but if the latter, which seems preferable, they may be continued for some time with great safety, without losing one day's work of the horse.

In some cases, there is frequently not only a discharge of fetid matter from the clefts of the frogs; but, at the same time, a discharge of greasy-like matter from the round protuberances of the heels, and the hollow of the pattern joints. It will be necessary, therefore, to make a distinction between the matter discharged in this case, which appears of a thick, white, clammy, or soapy consistence, and that running in the legs commonly termed a *grease*, which is of a quite opposite quality; the latter by good management will admit of a thorough cure, whilst the former baffles all the power of medicine.

2. In horses of a gross habit of body, especially the heavy draught-kind, running thrushes sometimes degenerate into what is commonly called a *canker*. In this case, the horny substance of the frog is soon thrown off; the fleshy parts grow to an immoderate size, the luxuriant substance or spongy flesh having a great number of papillæ or tubercles, which Mr Gibson compares not improperly to cauliflower, the colour only excepted, which is of a pale red, and sometimes variegated and tinged with blood; attended with a copious discharge of a thin ichorous fetid humour, having a most offensive smell. If its progress be not speedily stopped, the fleshy sole, from its vicinity, becomes likewise affected; the horny sole rots, decays, and falls off: the whole foot turns into a kind of quag or bog (in warm weather full of maggots, which it is almost impossible to prevent, even with the most corrosive dressings); the tendons become likewise affected; the bones carious, the hoof falls off, and the horse is rendered useless. To prevent these and the like consequences,

as soon as a running thrush begins to show the least malignant disposition, proper means must be used to correct the habit of body, and to divert this discharge to some other outlet, either by purging or diuretic remedies, continued for some time, bleeding being first premised. As to external applications, the first thing necessary to be done, is to pare down the crust till it is lower than the fungus, or growth of the canker, and to remove any hard pieces of the hoof or sole wherever it presses upon the tender parts; the circular part of the crust should be surrounded and kept soft with an emollient poultice. For dressings, the mildest escharotic powders may be first tried, as the following:

TAKE burnt alum powdered two ounces; blue vitriol powdered one ounce.

But when it degenerates into the last species mentioned above, affecting the fleshy sole, &c. the strongest corrosive applications will then be necessary, and sometimes hardly sufficient to keep down the luxuriancy of the fungus. The caustic oils are found preferable, as ol. vitriol. aquafortis, butter of antimony: either of these may be applied once every day; otherwise, if neglected dressing too long, or to every other day, which is the common practice, the great humidity and moisture issuing from the fungus so weakens the force of the strongest oils, that they have little or no effect: when these sharp dressings seem to gain upon the canker, it may be dressed with equal parts of red precipitate and burnt alum pounded and mixed together, till such time as the new sole begins to grow; the purging or diuretic medicines being given at proper intervals till the cure is completed.

SECT. XLV. Of False-quarter, and Sand-cracks.

1. What is commonly called a *false-quarter* in the foot of an horse is a cleft or chink in the side or quarter of the hoof, running in a slanting direction with the horny fibres of the hoof, from the coronet to its basis, by which the horny substance of the crust is divided; one part of the hoof being in a manner detached from the other, and rendered unable to sustain its portion or share of the weight of the limb, &c. and hence the name of *false-quarter*: for, when the horse sets his foot on the ground, the chink widens; but, when it is lifted up, the hardened edges of the divided hoof take in between them the tender and soft parts, and squeeze them so as to occasion frequent bleeding at the chink, and is frequently attended with inflammation, a discharge of matter, and of course lameness.

This complaint, notwithstanding the different accounts commonly given as to the cause of it, is in fact the effect of a deep wound or bruise upon the coronet, by which the continuity of the parts has been entirely broke off; for we always find, that when the horny fibres are divided at their roots, they never unite or grow up as before, but leave a blemish, more or less, in proportion to the size and deepness of such wounds, &c. We have many instances of this, even in the human body; for when a wound happens at the roots of the nails, whether in the fingers or toes, it occasions a blemish, which continues to grow in the same manner afterwards. Hence it will be evident, that no radical cure can possibly take place; but we may so far palliate the complaint as to render the horse something useful, by using a shoe of such a construction

False-quarter
and
Sand-cracks

False-quarter and sand cracks

tion as will support the weight of the limb, &c. without resting or pressing too much upon the weakened quarter; for which purpose, a round, or what is called a *barred shoe*, will be most proper. The surface of the hoof on and near the diseased part may be cut down lower than the surface of the crust upon which the shoe is to rest; or, if the hoof will not admit of being cut down, the shoe may be raised up from the weak quarter. Either of these means will remove the weight of the body from the diseased part, and the horse will go sounder.

But as sand and gravel is easily admitted into the chink or crack, where, being accumulated and pent up, it irritates and inflames the parts, whereby matter is formed underneath the hoof, which causes lameness, and which not unfrequently breaks out at the coronet, producing the most inveterate ulcers, which become extremely difficult to heal, on account of the sinus or fistula branching out in different directions underneath the hoof: therefore, horses with this defect should be carefully observed; and, when the thick hardened edges of the chink or crack grow too high, by which it is so much the deeper, and, of course, lodges the greater quantity of sand, &c. these edges should be rasped, or pared with a crooked knife, till the seam disappears. But wherever there remains a blackness, or appearance of gravel, that part must be tracked farther; always observing, if possible, to avoid drawing of blood. The chink or crack thus made smooth and equal, no sand or gravel can lodge in it; and as the parts will be tender, it will be necessary to apply an emollient poultice for some days, till the tenderness wear off. If the inflammation has been great, and matter formed in the crack, or the parts wounded by the knife in cutting its hardened edges, proud flesh may rise and jet out. In this case, the hard parts of the hoof near it are to be removed, a digestive poultice applied; and when the inflammation is abated, the proud flesh may be touched with the following corrosive powder:

Take blue vitriol burnt, two drams; corrosive sublimate, one dram; rubbed into powder.

2. A *sand-crack* is of much the same nature with a false-quarter; only they run more frequently in an horizontal direction than the latter; on the outside or surface of the crust: they are generally the effect of slight or superficial wounds upon the coronet, and grow gradually downwards towards the basis of the hoof, and at last are cut or rasped off in the shoeing; when they occasion lameness from lodging sand or gravel, they must be treated in the same manner as already mentioned for *False-quarters*.

SECT. XLVI. Of Horses cutting their Legs in Travelling.

Horses frequently cut their legs both before and behind, by striking or knocking the hoof when trotting, &c. against the opposite leg, whereby a wound is made, which is attended with an inflammation, swelling, &c. and of course lameness. The parts commonly wounded from cutting in the fore-legs, are the prominent and back part of the fetlock joint; and under the knee joint on the inside of the leg. The former is most common: the latter only happens to those

horses who raise their feet high in trotting; and, as such horses generally go fast, this last species of cutting is distinguished by the name of the *swift* or *speedy* cut.

In the hind-legs, horses cut themselves upon the prominent part of the fetlock-joint; and sometimes, especially those who move their legs too low, cut upon the coronet. But whether they cut before or behind, it commonly proceeds from some of the following causes.

1st, Injudicious shoeing; under which may be included, the hoofs being suffered to grow too large and broad, the shoe projecting over the inside edge of the hoof, the clenches or rivets of the nails rising above the surface of the crust.

There are a great variety of shoes recommended for preventing this complaint, of different constructions; but the most common are those that are made thick upon the inside heel. Others have a border or margin turned up upon the inside of the shoe's rim, commonly called a *feather*, which raises the inside of the hoof considerably higher from the ground than the outside. Either of these shoes may be of use to a dealer, in order to make a wry-footed horse appear to stand straight upon his limbs; but can have no effect upon a horse's manner of moving his legs, especially at the time when the foot is raised from the ground, and passing by the other leg, so as to prevent him from cutting. The reason why this method of shoeing seems to succeed, especially in the hind-feet, is this: when the shoe is made thick upon the inside heel, which part commonly strikes the opposite leg, the shoe-nails are removed to a considerable distance forward from the thick part of the shoe, which, at the same time, is kept much within the circle of the hoof; and, on that account, it becomes impossible that the shoe should touch the opposite leg. But, to show that this raising of the inside quarter or heel, by a thickness of iron in the shoe, is not necessary to prevent horses from cutting, the author has frequently caused the heel of the shoe to be made thinner than common; and, by keeping it within the hoof, it answered equally well with the former: he has likewise caused the shoe to be cut in the middle of the quarter, whereby the hoof at the heel was left quite bare; which answered the purpose so much the better, as the foot was the less loaded with the additional weight of superfluous iron.

2^d, The great weight of the concave shoes commonly used, is likewise another cause why horses, that in other respects move well upon their legs, do frequently cut and wound themselves; and to this we may add, the great length of the hoof at the toe, especially in the fore-feet, which is allowed frequently to grow to an unnatural size. It has been already observed, that a great load of iron is by no means necessary in a horse's shoe: on the contrary, it becomes a great disadvantage; for a flat one that is properly constructed, and well wrought, that is, well hammered, will wear as long as a concave or hollow shoe that is almost double the weight of the former. This, at first view, will perhaps appear a paradox; but, nevertheless, it is a fact: for as the round or outward surface of a concave shoe is the only part that touches the ground, and is liable to be worn, it soon grows thin, and yields to the pressure from the weight of the body; and there-

Cutting

fore

Cutting. fore must be renewed before the other parts of it are hardly touched, and but little reduced in its original weight. But the surface of a flat shoe, resting equally upon the ground, will remain firm upon the hoof, and be sufficiently strong to support the weight of the body till it wears very thin.

When horses cut or wound themselves immediately under the knee-joint, this is called the *swift* or *speedy cut*; and is occasioned by raising the feet high in trotting, whereby the inside toe or quarter of the hoof strikes against the opposite leg. This is easily prevented by making the shoe straight, and placing it considerably within the hoof at the part where the hoof strikes the other leg, observing that no nails are to be put in that part of the shoe which is kept so much within the hoof, otherwise they must immediately plunge into the quick.

3d, When cutting proceeds from a natural defect, that is, a wrong position of the foot upon the leg-bones, whereby the toes are turned too much outward or too much inward; at the same time, if the horse crosses his legs much in trotting; in this case there is no preventing his cutting altogether, though it may be palliated. Such horses are by no means fit for journey-riding, being generally addicted both to cutting and stumbling.

In the *last* place, it may proceed from fatigue or weakness. This happens frequently, even to those horses that deal their legs well (as the phrase is), especially in young horses; but they soon leave it off when they acquire more strength, and are accustomed to their work: most people must have experienced this in themselves when boys, as they at that age are very ready to knock their ancles with the heel of the opposite shoe, which custom wears off as they grow strong. Upon the whole, the best general rule that can be laid down for preventing horses from cutting their legs, is to keep their hoofs round and short at the toe, and from growing too large and broad; to observe that the shoe does not project over the inside edge of the hoof; that the clenches or rivets of the nails on the outer surface of the crust are smooth; and, above all, that the shoe be made light, well worked, and properly proportioned to the size of the foot. See the following head.

SECT. XLVII. SHOEING of HORSES.

HORSES are shod in order to defend and preserve their hoofs. As feet differ, so should shoes accordingly. "The only system of farriers, (Lord Pembroke observes), is to shoe in general with excessive heavy and clumsy ill-shaped shoes, and very many nails, to the total destruction of the foot. The cramps they annex, tend to destroy the bullet; and the shoes made in the shape of a walnut-shell prevent the horse's walking upon the firm basis which God has given him for that end, and thereby oblige him to stumble and fall. They totally pare away also and lay bare the inside of the animal's foot with their detestable butteries, and afterwards put on very long shoes, whereby the foot is hindered from having any pressure at all upon the heels, which pressure otherwise might still perchance, notwithstanding their dreadful cutting, keep the heels properly open, and the foot in good order. The frog should never be cut out; but as it will sometimes be-

Shoeing. come ragged, it must be cleaned every now and then, and the ragged pieces pared off with a knife. In one kind of foot indeed a considerable cutting away must be allowed of, but not of the frog: we mean, that very high feet must be cut down to a proper height; because, if they were not, the frog, though not cut, would still be so far above the ground, as not to have any bearing upon it, whereby the great tendon must inevitably be damaged, and consequently the horse would go lame.

"The weight of shoes must greatly depend on the quality and hardness of the iron. If the iron be very good, it will not bend; and in this case the shoes cannot possibly be made too light: care, however, must be taken, that they be of a thickness so as not to bend; for bending would force out the nails, and ruin the hoof. That part of the shoe which is next the horse's heel, must be narrower than any other, (as is seen in the draught, Plate CLXXXIX.) that stones may be thereby prevented from getting under it, and sticking there: which otherwise would be the case; because the iron, when it advances inwardly beyond the bearing of the foot, forms a cavity, wherein stones being lodged would remain and, by pressing against the foot, lame the horse. The part of the shoe which the horse walks upon should be quite flat, and the inside of it likewise; only just space enough being left next the foot to put in a picker (which ought to be used every time the horse comes into the stable), and also to prevent the shoe's pressing upon the sole. Four nails on each side hold better than a greater number, and keep the hoof in a far better state. The toe of the horse must be cut short, and nearly square (the angles only just rounded off); nor must any nails be driven there: this method prevents much stumbling, especially in descents; and serves, by throwing nourishment to the heels, to strengthen them: on them the horse should in some measure walk, and the shoe be made of a proper length accordingly; by this means, narrow heels are prevented, and many other good effects produced. Many people drive a nail at the toe, but it is an absurd practice. Leaving room to drive one there causes the foot to be of an improper length; and moreover, that part of the hoof is naturally so brittle, that even when it is kept well greased, the nail there seldom stays in, but tears out and damages the hoof. That the directions for shoeing a proper length may be the more clear and intelligible, we have annexed a draught of a foot shod a proper length standing on a plain surface, and with it a draught of the right kind of shoe.

"In wet, spongy, and soft ground, where the foot sinks in, the pressure upon the heels is of course greater than on hard ground; and so indeed it should be upon all accounts. The hinder-feet must be treated in the same manner as the fore-ones; and the shoes the same; except in hilly and slippery countries, they may not improperly be turned up a little behind; but turning up the fore-shoes is of no service, and is certain ruin to the fore-legs, especially to the bullets. In descending hills, cramps are apt to throw horses down, by stopping the fore-legs, out of their proper basis and natural bearing, when the hinder ones are rapidly pressed; which unavoidably must be the case, and consequently cannot but push the horse upon his nose. With them

Shoeing.

Shoeing.

them on a plain surface, a horse's foot is always thrown forwards on the toe, out of its proper bearing, which is very liable to make the horse tumble. The notion of their utility in going up hills is a false one. In ascending, the toe is the first part of the foot which bears on, takes hold of the ground, and whether the horse draws or carries, consequently the business is done before the part where the cramps are comes to the ground. Ice-nails are preferable to any thing to prevent slipping, as also to help horses up hill, the most forward ones taking hold of the ground early, considerably before the heels touch the ground: they must be so made, as to be, when driven in, scarce half an inch above the shoe, and also have four sides ending at the top in a point. They are of great service to prevent slipping on all kinds of places; and by means of them a horse is not thrown out of his proper basis. They must be made of very good iron; if they are not, the heads of them will be perpetually breaking off. From the race-horse to the cart-horse, the same system of shoeing should be observed. The size, thickness, and weight of them only should differ. The shoe of a race-horse must of course be lighter than that of a saddle-horse; that of a saddle-horse lighter than that of a coach or bat horse; and these last more so than a cart, waggon, or artillery horse. At present all shoes in general are too heavy; if the iron is good, shoes need not be so thick as they are now generally made.—The utmost severity ought to be inflicted upon all those who clap shoes on hot: this unpardonable laziness of farriers in making feet thus fit shoes, instead of shoes fitting feet, dries up the hoof, and utterly destroys them. Frequent removals of shoes are detrimental, and tear the foot; but sometimes they are very necessary: this is an inconvenience which half-shoes are liable to; for the end of the shoe, being very short, is apt to work soon into the foot, and consequently must then be moved."

In a late treatise on this subject by Mr Clark of Edinburgh, the common form of shoes, and method of shoeing, are, with great appearance of reason, totally condemned, and a new form and method recommended, which seem founded on rational principles, and to have been confirmed by experience.

Common method. "In preparing the foot for the shoe, our author observes, the frog, the sole, and the bars or binders, are pared so much that the blood frequently appears. The shoe by its form (being thick on the inside of the rim, and thin upon the outside*), must of consequence be made concave or hollow on that side which is placed immediately next the foot, in order to prevent its resting upon the sole. The shoes are generally of an immoderate weight and length, and every means is used to prevent the frog from resting upon the ground, by making the shoe-heels thick, broad, and strong, or raising cramps or caulkers on them.

"From this form of the shoe, and from this method of treating the hoof, the frog is raised to a considerable height above the ground, the heels are deprived of that substance which was provided by nature to keep the crust extended at a proper wideness, and the foot is fixed as it were in a mould.

"By the pressure from the weight of the body, and resistance from the outer edges of the shoe, the heels are forced together, and retain that shape impressed upon
N^o 125.

them, which it is impossible ever afterwards to remove; hence a contraction of the heels, and of course lameness. But farther.

"The heels, as has been observed, being forced together, the crust presses upon the processes of the coffin and extremities of the nut-bone: The frog is confined, and raised so far from the ground, that it cannot have that support upon it which it ought to have: the circulation of the blood is impeded, and a waiting of the frog, and frequently of the whole foot, ensues. Hence proceed all those diseases of the feet, known by the names of *founder*, *hoof-bound*, *narrow-heels*, *running thrushes*, *corns*, *high soles*, &c.

"I have likewise frequently observed, from this compression of the internal parts of the foot, a swelling of the legs immediately above the hoof, attended with great pain and inflammation, with a discharge of thin, ichorous, fetid matter: from which symptoms, it is often concluded, that the horse is in a bad habit of body (or what is termed a *grease falling down*), and must therefore undergo a course of medicine, &c.

"The bad effects of this practice are still more obvious upon the external parts of the hoof. The crust toward the toe, being the only part of the hoof free from compression, enjoys a free circulation of that fluid necessary for its nourishment, and grows broader and longer; from which extraordinary length of toe, the horse stumbles in his going, and cuts his legs. The smaller particles of sand insinuate themselves between the shoe and the heels, which grind them away, and thereby produce lameness. All this is entirely owing to the great spring the heels of the horse must unavoidably have upon the heels of a shoe made in this form.

"This concave shoe in time wears thin at the toe, and, yielding to the pressure made upon it, is forced wider, and of consequence breaks off all that part of the crust on the outside of the nails. Instances of this kind daily occur, inasmuch that there hardly remains crust sufficient to fix a shoe upon.

"It is generally thought, that the broader a shoe is, and the more it covers the sole and frog, a horse will travel the better. But, as has been formerly remarked, the broader a shoe is of this form, it must be made the more concave; and, of consequence, the contracting power upon the heels must be the greater. It is likewise to be observed, that, by using strong broad-rimmed concave shoes in the summer-season, when the weather is hot and the roads very dry and hard, if a horse is obliged to ride fast, the shoes, by repeated strokes (or friction) against the ground, acquire a great degree of heat, which is communicated to the internal parts of the foot; and, together with the contraction upon the heels occasioned by the form of the shoe, must certainly cause exquisite pain. This is frequently succeeded by a violent inflammation in the internal parts of the hoof, and is the cause of that disease in the feet so fatal to the very best of our horses, commonly termed a *founder*. This is also the reason why horses, after a journey or a hard ride, are observed to shift their feet so frequently, and to lie down much.

"If we attend further to the convex surface of this shoe, and the convexity of the pavement upon which

* See Plate CLXXXIX.

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which horses walk, it will then be evident that it is impossible for them to keep their feet from slipping in this form of shoe, especially upon declivities of streets.

"It is also a common practice, especially in this place, to turn up the heels of the shoes into what is called *cramps* or *caukers*, by which means the weight of the horse is confined to a very narrow surface, viz. the inner round edge of the shoe-rim and the points or caukers of each heel, which soon wear round and blunt; besides, they for the most part are made by far too thick and long. The consequence is, that it throws the horse forward upon the toes, and is apt to make him slip and stumble. To this cause we must likewise ascribe the frequent and sudden lameness horses are subject to in the legs, by twisting the ligaments of the joints, tendons, &c.

"I do not affirm that caukers are always hurtful, and ought to be laid aside: On the contrary, I grant, that they, or some such like contrivance, are extremely necessary, and may be used with advantage upon flat shoes where the ground is slippery; but they should be made thinner and sharper than those commonly used, so as to sink into the ground, otherwise they will rather be hurtful than of any advantage.

"The Chinese are said to account a small foot an ornament in their women, and for that purpose, when young, their feet are confined in small shoes. This no doubt produces the desired effect; but must necessarily be very prejudicial to them in walking, and apt to render them entirely lame.

"This practice, however, very much resembles our manner of shoeing horses: for, if we looked upon it as an advantage to them to have long feet, with narrow low heels, and supposing we observed no inconvenience to attend it, or bad consequence to follow it, we could not possibly use a more effectual means to bring it about, than by following the method already described.

"In shoeing a horse, therefore, we should in this, as in every other case, study to follow nature: and certainly that shoe which is made of such a form as to resemble as near as possible the natural tread and shape of the foot, must be preferable to any other.

"But it is extremely difficult to lay down fixed rules with respect to the proper method to be observed in treating the hoofs of different horses: it is equally difficult to lay down any certain rule for determining the precise form to be given their shoes. This will be obvious to every judicious practitioner, from the various constructions of their feet, from disease, and from other causes that may occur; so that a great deal must depend upon the discretion and judgment of the operator, in proportioning the shoe to the foot, by imitating the natural tread, to prevent the hoof from contracting a bad shape.

"In order, therefore, to give some general idea of what may be thought most necessary in this matter, I shall endeavour to describe that form of shoe and method of treating the hoofs of horses, which from experience I have found most beneficial.

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"*Proper Method.* It is to be remembered, that a horse's shoe ought by no means to rest upon the sole, otherwise it will occasion lameness; therefore it must rest entirely on the crust: and, in order that we may imitate the natural tread of the foot, the shoe must be made flat (if the height of the sole does not forbid it); it must be of an equal thickness all around the outside of the rim (A); and on that part of it which is to be placed immediately next the foot, a narrow rim or margin is to be formed, not exceeding the breadth of the crust upon which it is to rest, with the nail-holes placed exactly in the middle; and from this narrow rim the shoe is to be made gradually thinner towards its inner edge. See fig. 5.

"The breadth of the shoe is to be regulated by the size of the foot, and the work to which the horse is accustomed: but, in general, it should be made rather broad at the toe, and narrow towards the extremity of each heel, in order to let the frog rest with freedom upon the ground. The necessity of this has been already shown.

"The shoe being thus formed and shaped like the foot, the surface of the crust is to be made smooth, and the shoe fixed on with eight or at most ten nails, the heads of which should be sunk into the holes, so as to be equal with the surface of the shoe. The sole, frog, and bars, as I have already observed, should never be pared, farther than taking off what is ragged from the frog, and any excrescences or inequalities from the sole. And it is very properly remarked by Mr Osmer, 'That the shoe should be made so as to stand a little wider at the extremity of each heel than the foot itself: otherwise, as the foot grows in length, the heel of the shoe in a short time gets within the heel of the horse; which pressure often breaks the crust, and produces a temporary lameness, perhaps a corn.'

"This method of shoeing horses I have followed long before Mr Osmer's treatise on that subject was published; and for these several years past I have endeavoured to introduce it into practice.

"But so much are farriers, grooms, &c. prejudiced in favour of the common method of shoeing and paring out the feet, that it is with difficulty they can even be prevailed upon to make a proper trial of it.

"They cannot be satisfied unless the frog be finely shaped, the sole pared, and the bars cut out, in order to make the heels appear wide (B). This practice gives them a show of wideness for the time; yet that, together with the concave form of the shoe, forwards the contraction of the heels, which, when confirmed, renders the animal lame for life.

"In this flat form of shoe, its thickest part is upon the outside of the rim, where it is most exposed to be worn; and being made gradually thinner towards its inner edge, it is therefore much lighter than the common concave shoe: yet it will last equally as long, and with more advantage to the hoof; and as the frog or heel is allowed to rest upon the ground, the foot enjoys the same points of support as in its natural state. It must therefore be much easier for the horse in his

Y way

(A) For a draught-horse about half an inch thick, and larger in proportion for a saddle-horse.

(B) Wide open heels are looked upon as a mark of a sound good hoof.

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way of going, and be a means of making him surer-footed. It is likewise evident, that, from this shoe, the hoof cannot acquire any bad form; when, at the same time, it receives every advantage that possibly could be expected from shoeing. In this respect it may very properly be said, that we make the shoe to the foot, and not the foot to the shoe, as is but too much the case in the concave shoes, where the foot very much resembles that of a cat's fixed into a walnut-shell.

"It is to be observed, that the hoofs of young horses, before they are shod, for the most part are wide and open at the heels, and that the crust is sufficiently thick and strong to admit of the nails being fixed very near the extremities of each. But, as I have formerly remarked, from the constant use of concave shoes, the crust of this part of the foot grows thinner and weaker; and when the nails are fixed too far back, especially upon the inside, the horse becomes lame: to avoid this, they are placed more towards the fore part of the hoof. This causes the heels of the horse to have the greater spring upon the heels of the shoe, which is so very detrimental as to occasion lameness; whereas, by using this flat form of shoe, all these inconveniences are avoided; and if the hoofs of young horses, from the first time that they were shod, were continued to be constantly treated according to the method here recommended, the heels would always retain their natural strength and shape.

"By following this flat method of shoeing, and manner of treating the hoofs, several horses now under my care, that were formerly tender-footed, and frequently lame, while shod with broad concave shoes, are now quite sound, and their hoofs in as good condition as when the first shoes were put upon them: In particular, the horse that wore the broad concave shoes, from which the drawings of fig. 2. and 3. were taken, now goes perfectly sound in the open narrow kind of shoes, as represented fig. 4. 5.

"If farriers considered attentively the design of shoeing horses, and would take pains to make themselves acquainted with the anatomical structure of the foot, they would then be convinced, that this method of treating the hoofs, and this form of shoe is preferable to that which is so generally practised.

"It has been alleged, that in this form of shoe horses do not go so well as in that commonly used. This objection will easily be laid aside, by attending to the following particulars. There are but few practitioners that can or will endeavour to make this sort of shoe as it ought to be. The iron, in forming it, does not so easily turn into the circular shape necessary as in the common shoe; and perhaps this is the principal reason why farriers object to it, especially where they work much by the piece. And as many horses that are commonly shod with concave shoes have their soles considerably higher than the crust, if the shoe is not properly formed, or if it is made too flat, it must unavoidably rest upon the sole, and occasion lameness.

"The practice of paring the sole and frog is also so prevalent, and thought so absolutely necessary, that it is indiscriminately practised, even to excess, on all kinds of feet: And while this method continues to be followed, it cannot be expected that horses can go

upon hard ground (on this open shoe) with that freedom they would do if their soles and frogs were allowed to remain in their full natural strength.

"Experience teaches us, that, in very thin-soled shoes, we feel an acute pain from every sharp-pointed stone we happen to tread upon. Horses are sensible of the same thing in their feet, when their soles, &c. are pared too thin. Hence they who are prejudiced against this method, without ever reflecting upon the thin state of the sole, &c. are apt to condemn it, and draw their conclusions more from outward appearances than from any reasoning or knowledge of the structure of the parts. From a due attention likewise to the structure of a horse's foot in a natural state, it will be obvious, that paring away the sole, frog, &c. must be hurtful, and in reality is destroying that substance provided by nature for the defence of the internal parts of the foot: From such practice it must be more liable to accidents from hard bodies, such as sharp stones, nails, glass, &c. From this consideration we will likewise find, that a narrow piece of iron adapted to the shape and size of the foot, is the only thing necessary to protect the crust from breaking or wearing away; the sole, &c. requiring no defence if never pared.

"There is one observation I would farther make, which is, that the shoe should be made of good iron, well worked, or what smiths call *hammer-hardened*, that is, beat all over lightly with a hammer when almost cold. The Spaniards and Portuguese farriers use this practice greatly, inasmuch that many people, who have seen them at work, have reported that they form their horses shoes without heating them in the fire as we do. It is well known, that heating of iron till it is red softens it greatly; and when shoes thus softened are put upon horses feet, they wear away like lead. But when the shoes are well hammered, the iron becomes more compact, firm, and hard; so that a well-hammered shoe, though made considerably lighter, yet will last as long as one that is made heavier; the advantage of which is obvious, as the horse will move his feet with more activity, and be in less danger of cutting his legs.

"The common concave shoes are very faulty in this respect; for, in fitting or shaping them to the foot, they require to be frequently heated, in order to make them bend to the unequal surface which the hoof acquires from the constant use of these shoes: they thereby become soft; and to attempt to harden them by beating or hammering when they are shaped to the foot would undo the whole. But flat shoes, by making them, when heated, a little narrower than the foot, will, by means of hammering, become wider, and acquire a degree of elasticity and firmness which it is necessary they should have, but impossible to be given them by any other means whatever; so that any farrier, from practice, will soon be able to judge, from the quality of the iron, how much a shoe, in fitting it to the circumference of the hoof, will stretch by hammering when it is almost cold: this operation, in fitting flat shoes, will be the less difficult, especially when it is considered, that as there are no inequalities on the surface of the hoof (or at least ought not to be) which require to be bended thereto, shoes of this kind only require to be made smooth and flat; hence

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When the roads, &c. are covered with ice, it becomes necessary to have the heels of the shoes turned up, and frequently sharpened, in order to prevent horses from slipping and falling. As this cannot be done without the frequent moving of the shoes, which breaks and destroys the crust of the hoofs where the nails are drove, to prevent this, it is recommended to those who are willing to be at the expence, to have steel points screwed into the heels or quarters of each shoe, which might be taken out and put in occasionally.

The method of doing this properly, as directed by Mr Clark, is first to have the shoes fitted to the shape of the hoof, then to make a small round hole in the extremity of each heel, or in the quarters, about three-eighths of an inch in diameter, or more, in proportion to the breadth and size of the shoe; in each of these holes a screw is to be made; the steel points are likewise to have a screw on them, exactly fitted to that in the shoes. Care must be taken that the screw on the points is no longer, when they are screwed into the shoe, than the thickness of the latter. The steel points are to be made sharp; they may either be made square, triangular, or chisel pointed, as may be most agreeable; the height of the point above the shoe should not exceed half an inch for a saddle horse; they may

be made higher for a draught horse. The key or handle that is necessary to screw them in and out occasionally, is made in the shape of the capital letter T, and of a sufficient size and strength; at the bottom of the handle, a socket or cavity must be made, properly adapted to the shape of the steel point, and so deep as to receive the whole head of the point that is above the shoe. In order to prevent the screw from breaking at the neck, it will be necessary to make it of a gradual taper; the same is likewise to be observed of the female screw that receives it, that is, the hole must be wider on the upper part of the shoe than the under part; the sharp points may be tempered or hardened, in order to prevent them from growing too soon blunt; but when they become blunt, they may be sharpened as at first. These points should be unscrewed when the horse is put into the stable, as the stones will do them more injury in a few minutes than a days riding on ice. A draught horse should have one point on each shoe, as that gives them firmer footing in drawing on ice; but for a saddle horse, when they are put there, they are apt to make him trip and stumble.

When the shoes are provided with these points, a horse will travel on ice with the greatest security and steadiness, much more so than on causeway or turnpike roads, as the weight of the horse presses them down in the ice at every step he makes.

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Farthing, Fasces.

F A S
FARTHING, a small English copper coin, amounting to one-fourth of a penny. It was anciently called *fourthing*, as being the fourth of the integer or penny.

FARTHING of Gold, a coin used in ancient times, containing in value the fourth part of a noble, or 20d. silver. It is mentioned in the stat. 9 Hen. V. cap. 7. where it is enacted, that there shall be good and just weight of the noble, half-noble, and farthing of gold.

FARTHING of Land seems to differ from **FARDING-deal**. For in a survey-book of the manor of West-Hampton in Devonshire, there is an entry thus: A. B. holds six farthings of land at 126l. *per ann.* So that the farthing of land must have been a considerable quantity, far more than a rood.

FASCES, in Roman antiquity, axes tied up together with rods, or staves, and borne before the Roman magistrates as a badge of their office and authority.

According to Florus, the use of the fasces was introduced by the elder Tarquin the fifth king of Rome; and were then the mark of the sovereign dignity. In after-times they were borne before the consuls, but by turns only, each his day; they had each of them 12, borne by as many lictors. These fasces consisted of branches of elm; having in the middle a securis or axe, the head of which stood out beyond the rest. Publiola took the axe out of the fasces, as Plutarch assures us, to remove from the people all occasion of terror. After the consuls, the pretors assumed the fasces. In the government of the decemvirs, it was the practice at first for only one of them to have the fasces. After-

wards each of them had twelve, after the manner of the kings.

When the magistrates who by right had the axes carried before them, had a mind to show some deference to the people, or some person of singular merit, they either sent away the lictors, or commanded them to lower the fasces before them, which was called *submittere fasces*. Many instances of this occur in Roman history.

FASCETS, in the art of making glass, are the irons thrust into the mouths of bottles, in order to convey them to the annealing tower.

FASCIA, in antiquity, a thin sash which the Roman women wrapped round their bodies, next to the skin, in order to make them slender. Something of this sort seems also to have been in use amongst the Grecian ladies, if we can depend upon the representation given by Terence, Eun. Act. 2. Sc. 4.

*Haud similis est virginum nostrarum, quas matres student
Demissis humeris esse—vincto corpore, ut graciles fiant.*

FASCIA, in architecture, signifies any flat member having a considerable breadth and but a small projection, as the band of an architrave, larmier, &c. In brick-buildings, the juttings out of the bricks beyond the windows in the several stories except the highest are called *fascias*, or *fascia*.

FASCIA Lata, in anatomy, a muscle of the leg, called also *semi-membranosus*. See **ANATOMY**, *Table of the Muscles*.

FASCIÆ, in astronomy, the belts seen on the disk of the superior planets Mars, Jupiter, and Saturn. See **ASTRONOMY passim**.

Fascets, Fascia.

Fascialis
||
Fashion-
pieces.

FASCIALIS, in anatomy, one of the muscles of the thigh, called *sartorius*. See *ANATOMY*, Table of the Muscles.

FASCINATION (from the Greek *βασκανισμός*, to fascinate or bewitch), a sort of witchcraft supposed to operate either by the eye or the tongue.

Ancient writers distinguish two sorts of fascination, one performed by looking, or the efficacy of the eye. Such is that spoken of by Virgil in his third eclogue:

Nescio quis teneros oculus mihi fascinat oculos.

The second by words, and especially malignant praises. Such is that mentioned by the same poet in his seventh eclogue:

*Aui, si ultra placitum laudabit, baccare frontem
Cingite, ne vati noceat mala lingua futuro*

Horace touches on both kinds in his first book of epistles:

*Non istis obliquo oculo mea commoda quisquam
Limat, non olio obscuro, morsuque venenat.*

FASCINES, in fortification, faggots of small wood, of about a foot diameter, and six feet long, bound in the middle, and at both ends. They are used in raising batteries; making chandeliers, in filling up the moat to facilitate the passage to the wall, in binding the ramparts where the earth is bad, and in making parapets of trenches to screen the men. Some of them are dipped in melted pitch or tar; and, being set on fire, serve to burn the enemy's lodgments or other works.

In the corrupt Latin they use *fascenina*, *fascennia*, and *fascinata*, &c. to signify the pales, fascines, &c. used to inclose the ancient castles, &c.

FASCIOLA, in zoology, the **FLUKE** or **GOURD WORM**: A genus of insects of the order of vermes intestina; of which the characters are these: The body is flattish, and has a vent hole at the extremity and on the belly. There are several species. 1. The hepatica, or liver-fluke, grows to two thirds of an inch in length, though it is more usually met with not half that size; and its breadth is nearly equal to two thirds of its length: it is flattish, but somewhat rounded on the back, and has about eight deep longitudinal furrows in two series; its skin is soft and whitish, with a tinge of brown. The hinder part is rounded, the fore part is furnished with a large mouth; it bears some resemblance to the seed of the common gourd, whence it has acquired the name of the *gourd worm*. It is found in fresh waters, in ditches, at the roots of stones, sometimes in the intestines, and often in the substance of the other viscera in quadrupeds. It often infests the liver of sheep, and on that account is called *hepatica*. Bags with salt in them should be placed in the fold that the sheep might lick them, which is the only remedy. 2. The Intestinalis, or Intestinal Fluke, is of a long slender form, if extended; when contracted, of a suboval form. Inhabits the intestines of fresh-water fish; often found in breams. 3. The barbata, is white, with transverse papillæ in the mouth. It is of an oblong shape, and about the size of a cucumber-seed. It is found in the intestines of the sepia lotigo.

FASHION-PIECES, in the sea-language, the aftmost or hindmost timbers of a ship, which terminate the breadth, and form the shape of the stern. They are united to the stern-post, and to the extremity of the

wing-transom, by a rabbit, and a number of strong nails or spikes driven from without.

FAST, in general, denotes the abstinence from food, (see *FASTING*); but is more particularly used for such abstinence on a religious account.

Religious fasting has been practised by most nations from the remotest antiquity. Some divines even pretend its origin in the earthly paradise, where our first parents were forbidden to eat of the tree of knowledge. But though this seems carrying the matter too far, it is certain, that the Jewish church has observed fasts ever since its first institution. Nor were the neighbouring heathens, viz. the Egyptians, Phœnicians, and Assyrians, without their fasts. The Egyptians, according to Herodotus, sacrificed a cow to Isis, after having prepared themselves by fasting and prayer: a custom which he likewise ascribes to the women of Cyrene. Porphyry affirms, that the Egyptians, before their stated sacrifices, always fasted a great many days, sometimes for six weeks; and that the least behoved to be for seven days: during all which time the priests and devotees not only abstained from flesh, fish, wine, and oil; but even from bread, and some kinds of pulse. These austerities were communicated by them to the Greeks, who observed their fasts much in the same manner. The Athenians had the Eleusinian and Theophorian fasts, the observation of which was very rigorous, especially among the women, who spent one whole day sitting on the ground in a mournful dress, without taking any nourishment. In the island of Crete, the priests of Jupiter were obliged to abstain all their lives from fish, flesh, and baked meats. Apuleius informs us, that whoever had a mind to be initiated in the mysteries of Cybele were obliged to prepare themselves by fasting ten days; and, in short, all the pagan deities, whether male or female, required this duty of those that desired to be initiated into their mysteries, of their priests and priestesses that gave the oracles, and of those that came to consult them.

Among the heathens fasting was also practised before some of their military enterprises. Aristotle informs us, that the Lacedæmonians having resolved to succour a city of the allies, ordained a fast throughout the whole extent of their dominions, without excepting even the domestic animals: and this they did for two ends; one to spare provisions in favour of the besieged; the other to draw down the blessing of heaven upon their enterprise. The inhabitants of Tarentum, when besieged by the Romans, demanded succours from their neighbours of Rhegium, who immediately commanded a fast throughout their whole territories. Their enterprise having had good success by their throwing a supply of provisions into the town, the Romans were obliged to raise the siege; and the Tarentines, in memory of this deliverance, instituted a perpetual fast.

Fasting has always been reckoned a particular duty among philosophers and religious people, some of whom have carried their abstinence to an incredible length. At Rome it was practised by kings and emperors themselves. Numa Pompilius, Julius Cæsar, Augustus, Vespasian, and others, we are told, had their stated fast-days: and Julian the apostate was so exact in this observance as to outdo the priests themselves, and even the most rigid philosophers. The Pythagoreans kept a

Fast.

con-

Fast. continual lent; but with this difference, that they believed the use of fish to be equally unlawful with that of flesh. Besides their constant temperance, they also frequently fasted rigidly for a very long time. In this respect, however, they were all outdone by their master Pythagoras, who continued his fasts for no less than 40 days together. Even Apollonius Tyaneus, one of his most famous disciples, could never come up to him in the length of his fasts, though they greatly exceeded those of the ordinary Pythagoreans. The gymnosophists, or brachmans of the east, are also very remarkable for their severe fastings; and the Chinese, according to father le Comte, have also their stated fasts, with forms of prayer for preserving them from barrenness, inundations, earthquakes, &c. The Mahometans too, who possess so large a part of Asia, are very remarkable for the strict observance of their fasts; and the exactness of their dervises in this respect is extraordinary.

Fasting was often used by the heathens for superstitious purposes; sometimes to procure the interpretations of dreams; at others, to be an antidote against their pernicious consequences. A piece of superstition prevails to this day among the Jews; who, though expressly forbidden to fast on Sabbath-days, think themselves at liberty to dispense with this duty when they happen to have frightful and unlucky dreams the night preceding, that threatened them with great misfortunes. On these occasions they observe a formal fast the whole day; and at night the patient, having invited three of his friends, addresses himself to them seven times in a very solemn manner, saying, "May the dream I have had prove a lucky one!" And his friends answer as many times, "Amen, may it be lucky, and God make it so!" After which, in order to encourage him, they conclude the ceremony with these words of Ecclesiastes, "Go eat thy bread with joy;" and then set themselves down to table. They have also added several fasts not commanded in the law of Moses, particularly three, in memory of sore distresses their nation has suffered at different times. The abstinence of the ancient Jews commonly lasted 27 or 28 hours at a time; beginning before sunset, and not ending till some hours after sunset next day. On these days they were obliged to wear white robes in token of grief and repentance; to cover themselves with sackcloth, or their worst clothes: to lie on ashes; to sprinkle them on their head, &c. Some spent the whole night and day following in the temple or synagogue, in prayers and other devotions, barefooted, with a scourge in their hands, of which they sometimes made a good use in order to raise their zeal. Lastly, in order to complete their abstinence, at night they were to eat nothing but a little bread dipped in water, with some salt for seasoning; except they chose to add to their repast some bitter herbs and pulse.

The ancients, both Jews and Pagans, had also their fasts for purifying the body, particularly the priests and such as were any way employed at the altars; for when nocturnal disorders happened to these, it was unlawful for them to approach all the next day, which they were bound to employ in purifying themselves. On this account, at great festivals, where their ministry could not be dispensed with, it was usual for them, on

the eve thereof, not only to fast, but also to abstain from sleep, for the greater certainty. For this purpose the high-priest had under-officers to wake him, if overtaken with sleep; against which other preservatives were also made use of.

FASTERMANS, or **FASTING-MEN**, q. d. *homines habentes*, was used in our ancient customs for men in repute and substance; or rather for pledges, sureties, or bondsmen, who, according to the Saxon polity, were fast bound to answer for one another's peaceable behaviour.

FASTI, in Roman antiquity, the kalendar wherein were expressed the several days of the year, with their feasts, games, and other ceremonies.

There were two sorts of fasti, the greater and less; the former being distinguished by the appellation *fasti magistrates*, and the latter by that of *fasti kalendares*.

1. The *Fasti Kalendares*, which were what was properly and primarily called *fasti*, are defined by Festus Pompeius to be books containing a description of the whole year: i. e. Ephemerides, or diaries, distinguishing the several kinds of days, *festi*, *profesti*; *fasti*, *nefasti*, &c. The author hereof was Numa, who committed the care and direction of the fasti to the pontifex maximus, whom the people used to go and consult on every occasion. This custom held till the year of Rome 450, when C. Flavius, secretary to the pontifices, exposed in the forum a list of all the days whereon it was lawful to work; which was so acceptable to the people, that they made him curule ædile.

These lesser fasti, or fasti kalendares, were of two kinds, *urbani* and *rustici*.

The *fasti urbani*, or fasti of the city, were those which obtained or were observed in the city. Some will have them thus called because they were exposed publicly in divers parts of the city; though, by the various inscriptions or gravings thereof on antique stones, one would imagine that private persons had them likewise in their houses. Ovid undertook to illustrate these fasti urbani, and comment on them, in his *Libri Fastorum*, whereof we have the six first books still remaining; the six last, if ever they were written, being lost.

In the *fasti rustici*, or country fasti, were expressed the several days, feasts, &c. to be observed by the country people: for as these were taken up in tilling the ground, fewer feasts, sacrifices, ceremonies, and holidays, were enjoined them than the inhabitants of cities; and they had also some peculiar ones not observed at Rome. These rustic fasti contained little more than the ceremonies of the calends, nones, and ides; the fairs, signs of the zodiac, increase and decrease of the days, the tutelary gods of each month, and certain directions for rural works to be performed each month.

2. In the greater fasti, or *Fasti Magistrales*, were expressed the several feasts, with every thing relating to the gods, religion, and the magistrates; the emperors, their birth-days, offices, days consecrated to them, and feasts and ceremonies established in their honour, or for their prosperity, &c. With a number of such circumstances did flattery at length swell the fasti; when they became denominated *Mæni* to distinguish them from the bare kalendar, or fasti kalendares.

FASTI was also a chronicle or register of time, where-

**Faster-
mans,
Fasti.**

Fasti,
Fasting.

in the several years were denoted by the respective consuls, with the principal events that happened during their consulates; these were called also *fasti consulares*, or *consular fasti*.

FASTI, or *Dies Fasti*, also denoted court-days. The word *fasti fastorum*, is formed of the verb *fari*, "to speak," because during those days the courts were opened, causes might be heard, and the prætor was allowed *fari*, to pronounce the three words, *do, dico, addico*: The other days wherein this was prohibited were called *nefasti*: thus Ovid,

*Ille nefastus erit, per quem tria verba silentur :
Festus erit, per quem lege licebit agi.*

These *dies fasti* were noted in the kalender by the letter *F*: but observe, that there were some days *ex parte fasti*, partly *fasti*, partly *nefasti*; i. e. justice might be distributed at certain times of the day, and not at others. These days were called *intercisi*, and were marked in the kalender thus; *F. P. fastos primo*, where justice might be demanded during the first part of that day.

FASTING, the abstaining from food. See FAST.

Many wonderful stories have been told of extraordinary fasting; great numbers of which undoubtedly must be false. Others, however, we have on very good authority, of which some are mentioned under the article ABSTINENCE. Another we have in the

FASTING Woman. A full account of this very uncommon case is given in the Phil. Trans. Vol. LXVII. Part I. the substance of which follows: The woman, whose name was *Janet M'Leod*, an inhabitant in the parish of Kincardine in Rosshire, continued healthy till she was 15 years of age, when she had a pretty severe epileptic fit; after this she had an interval of health for four years, and then another epileptic fit which continued a whole day and a night. A few days afterwards she was seized with a fever, which continued with violence several weeks, and from which she did not perfectly recover for some months. At this time she lost the use of her eye-lids; so that she was under a necessity of keeping them open with the fingers of one hand, whenever she wanted to look about her. In other respects she continued in pretty good health; only she never had any appearance of menses, but periodically spit up blood in pretty large quantities, and at the same time it flowed from the nose. This discharge continued several years; but at last it ceased: and soon after she had a third epileptic fit, and after that a fever from which she recovered very slowly. Six weeks after the crisis, she stole out of the house unknown to her parents, who were busied in their harvest work, and bound the sheaves of a ridge before she was observed. In the evening she took to her bed, complaining much of her *heart* (most probably her *stomach*, according to the phraseology of that country) and her head. From that time she never rose for five years, but was occasionally lifted out of bed. She seldom spoke a word, and took so little food that it seemed scarce sufficient to support a sucking infant. Even this small quantity was taken by compulsion; and at last, about Whit Sunday 1763, she totally refused every kind of food or drink. Her jaw now became so fast locked, that it was with the greatest difficulty her father was able to open her teeth a little, in order to admit a small quantity of gruel or whey; but of this so much generally run out at the corners of her mouth,

Fasting.

that they could not be sensible any had been swallowed. About this time they got some water from a noted medicinal spring in Brae-Mar, some of which they attempted to make her swallow, but without effect. They continued their trials, however, for three mornings; rubbing her throat with the water, which run out at the corners of her mouth. On the third morning during the operation, she cried out, "Give me more water;" and swallowed with ease all that remained in the bottle. She spoke no more intelligibly for a year; though she continued to mutter some words, which her parents only understood, for 14 days. She continued to reject all kinds of food and drink till July 1765. At this time her sister thought, by some signs she made, that she wanted her jaws opened; and this being done, not without violence, she called intelligibly for a drink, and drank with ease about an English pint of water. Her father then asked her why she would not make some signs when she wanted a drink? to which she answered, why should she when she had no desire. It was now supposed that she had regained the faculty of speech; and her jaws were kept open for about three weeks by means of a wedge. But in four or five days she became totally silent, and the wedge was removed because it made her lips sore. She still, however, continued sensible; and when her eye-lids were opened, knew every body, as could be guessed from the signs she made.

By continuing their attempts to force open her jaws, two of the under foreteeth were driven out; and of this opening her parents endeavoured to avail themselves by putting some thin nourishing drink into her mouth; but without effect, as it always returned by the corners. Sometimes they thought of thrusting a little dough of oatmeal through this gap of the teeth, which she would retain a few seconds, and then return with something like a straining to vomit, without one particle going down. Nor were the family sensible of any thing like swallowing for four years, excepting the small draught of Brae-Mar water and the English pint of common water. For the last three years she had not any evacuation by stool or urine, except that once or twice a-week she passed a few drops of urine, about as much, to use the expression of her parents, as would wet the surface of a halfpenny. In this situation she was visited by Dr Mackenzie, who communicated the account of her case to the Royal Society. He found her not at all emaciated; her knees were bent and the hamstrings tight, so that her heels almost touched her buttocks. She slept much, and was very quiet: but when awake, kept a constant whimpering like a newborn weakly infant. She never could remain a moment on her back, but always fell to one side or another; and her chin was clapped close to her breast, nor could it by any force be moved backwards.

The doctor paid his first visit in the month of October; and five years afterwards, viz. in October 1772, was induced to pay her a second visit, by hearing that she was recovering, and had begun to eat and drink. The account given him was most extraordinary. Her parents one day returning from their country-labours (having left their daughter fixed to her bed as usual), were greatly surprised to find her sitting upon her hams, on the side of the house opposite to her bed-place, spinning with her mother's distaff. All the food she took

at

Fasting.

at that time was only to crumble a little oat or barley cake in the palm of her hand, as if to feed a chicken. She put little crumbs of this into the gap of her teeth; rolled them about for some time in her mouth; and then sucked out of the palm of her hand a little water, whey, or milk; and this only once or twice a-day, and even that by compulsion. She never attempted to speak; her jaws were fast locked, and her eyes shut. On opening her eye-lids, the balls were found to be turned up under the edge of the os frontis; her countenance was ghastly, her complexion pale, and her whole person emaciated. She seemed sensible, and tractable in every thing except in taking food. This she did with the utmost reluctance, and even cried before she yielded. The great change of her looks Dr Mackenzie attributed to her spinning flax on the distaff, which exhausted too much of the saliva; and therefore he recommended to her parents to confine her totally to the spinning of wool. In 1775, she was visited again, and found to be greatly improved in her looks as well as strength; her food was also considerably increased in quantity; though even then she did not take more than would be sufficient to sustain an infant of two years of age.

The following remarkable instances of animals being able to live long without food, are related by Sir William Hamilton in his account of the late earthquakes in Italy, (*Phil. Transf.* vol. 73.) "At Soriano (says he), two fattened hogs that had remained buried under a heap of ruins, were taken out alive the 42d day; they were lean and weak, but soon recovered." Again, "At Messina two mules belonging to the Duke de Belviso remained under a heap of ruins, one of them 22 days, and the other 23 days: they would not eat for some days, but drank water plentifully, and are now recovered. There are numberless instances of dogs remaining many days in the same situation; and a hen belonging to the British vice-consul at Messina, that had been closely shut up under the ruins of his house, was taken out the 22d day, and is now recovered; it did not eat for some days, but drank freely; it was emaciated, and showed little signs of life at first. From these instances, and those related before of the hogs at Soriano, and several others of the same kind that have been related to me, but which being less remarkable I omit, one may conclude, that long fasting is always attended with great thirst and total loss of appetite."

An instance of a similar kind, not less remarkable than either of the two preceding, we find in the Gentleman's Magazine for Jan. 1785, communicated by a correspondent, as follows: "During the heavy snow which fell in the night of the 7th of January 1776, a parcel of sheep belonging to Mr John Wolley, of Matlock, in Derbyshire, which were pastured on that part of the East Moor that lies within the manor of Matlock, were covered with the drifted snow: in the course of a day or two all the sheep that were covered with the snow were found again, except two, which were consequently given up as lost; but on the 14th of February following (some time after the break of the snow in the valleys, and 38 days after the fall), as a servant was walking over a large parcel of drifted snow which remained on the declivity of a hill, a dog he had with him discovered one of the two sheep that

had been lost, by winding (or scenting) it through a small aperture which the breath of the sheep had made in the snow; the servant thereupon dug away the snow, and released the captive from its prison; it immediately ran to a neighbouring spring, at which it drank for a considerable time, and afterwards rejoined its old companions as though no such accident had befallen it. On inspecting the place where it was found, it appeared to have stood between two large stones which lay parallel with each other at about two feet and an half distance, and probably were the means of protecting it from the great weight of the snow, which in that place lay several yards thick; from the number of stones around it, it did not appear that the sheep had been able to pick up any food during its confinement. Soon afterwards its owner removed it to some low lands; but as it had nearly lost its appetite, it was fed with bread and milk for some time: in about a fortnight after its enlargement it lost its sight and wool; but in a few weeks afterwards they both returned again, and in the course of the following summer it was quite recovered. The remaining sheep was found dead about a week after the discovery of the other."

In the same publication † is recorded the death of one Caleb Elliot, a visionary enthusiast, who meant to have fasted 40 days, and actually survived 16 without food, having obstinately refused sustenance of every kind.

FASTOLF (Sir John), a valiant and renowned English officer, a knight-banneret and of the garter, who served in France under Henry IV. V. and VI. was descended from an ancient family in Norfolk, and was born about the year 1377. He was as much distinguished for his virtue at home as for his valour abroad; and became no less amiable in his private, than he had been admirable in his public character. He died in 1459, upwards of 80 years of age, as we learn from his noted cotemporary William Caxton the first English printer. By an unaccountable mistake it has been asserted, that Shakespear's Falstaff was drawn to ridicule this great man; and this has made judicious biographers more studious to preserve his reputation.

FAT, an oily concrete substance deposited in different parts of animal bodies. See ANATOMY, n° 83.

Strong exercise, preternatural heat, an acrimonious state of the juices, and other like causes, by which the oily parts of the blood are attenuated, resolved, or evacuated, prevent the generation of fat; labours of the mind also have this effect, as well as labour or intemperance of the body. Hence rest and plentiful food are sufficient to fatten brutes; but with men it is often otherwise. It is surprising how soon some birds grow fat; ortolans in 24 hours, and larks still sooner.

Fats may be divided, from their consistence, into three kinds: (1.) The soft and thin, which grow perfectly liquid in a very small heat; (2.) The thick and consistent, which liquify less readily; and, (3.) The hard and firm, which require a still stronger heat to melt them. The first is called *Pinguedo*; the second, *Auxungia*; and the third, *Adeps*, as taken from the animal; and *Sebum*, or *Sevum*, when freed from the skins, &c. This use of the names, however, is not constant, some employing them differently.

A great number of fats have been kept in the shops,

Fasting
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Fat.† Suppl. for
1789. O-
bituary,
p 1215.

Fat. for making ointments, plasters, and other medicinal compositions; as hog's-lard, the fat of the boar, the fox, the hair, dog, wild cat, Alpine mouse, beaver; that of hens, ducks, geese, flocks; of the whale, pike, serpents, viper, &c. as also human fat.—In regard to all these kind of substances, however, much depends upon the manner of purifying or trying, and of keeping them.

To obtain fat pure, it must be cut into pieces, and cleaned from the interposed membranes and vessels. It must then be cleaned from its gelatinous matter by washing with water, till the water comes from it colourless and insipid; it is afterwards to be melted with a moderate heat in a proper vessel with a little water; and it is to be kept thus melted till the water be entirely evaporated, which is known by the discontinuance of the boiling, which is caused by the water only, and which lasts till not a drop of it remains: it is afterwards to be put into an earthen pot, where it fixes; then it is exceedingly white, sufficiently pure for the purposes of pharmacy or chemical examination.

Fat thus purified has very little taste, and a weak, but peculiar, smell.

For the analysis, chemical properties, &c. of fat, see **CHEMISTRY**, n^o 1015. and 1428.

One of the chief uses of fat probably is, to receive into its composition, to blunt and correct, a great part of the acids of the aliments, and which are more than are requisite to the composition of the nutritive juice, or which nature could not otherwise expel. This is certain, that the greater the quantity of aliments is taken by healthy animals above what is necessary for their nourishment and reproduction, the fatter they become. Hence animals which are castrated, which are not much exercised, or which are come to an age when the loss and production of the seminal fluid is less, and which at the same time consume much succulent aliment, generally become fatter, and sometimes exceedingly so.

Although fat be very different from truly animalised substances, and appears not easily convertible into nutritive juices, it being generally difficult of digestion, and apt to become rancid, as butter does in the stomachs of many persons; yet in certain cases it serves to the nourishment and reparation of the body. Animals certainly become lean, and live upon their fat, when they have too little food, and when they have diseases which prevent digestion and the production of the nutritive juice; and in these cases the fatter animals hold out longer than the leaner. The fat appears to be then absorbed by the vessels designed for this use, and to be transformed into nutritive juice.

FAT, in the sea-language, signifies the same with broad. Thus a ship is said to have a fat quarter, if the trussing-in or tuck of her quarter be deep.

FAT likewise denotes an uncertain measure of capacity. Thus a fat of singlals contains from $3\frac{1}{2}$ hundred weight to 4 hundred weight; a fat of unbound books, half a maund or four bales; of wire, from 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FAT, or **VAT**, is used also for several utensils: as. 1. A great wooden vessel, employed for the measuring of malt, and containing a quarter or eight bushels. 2. A large brewing vessel, used by brewers to run their wort in.

3. A leaden pan or vessel for the making of salt at Droitwich.

Fate.

FATA MORGANA, a very remarkable aerial phenomenon, which is sometimes observed from the harbour of Messina and adjacent places, at a certain height in the atmosphere. The name, which signifies the *Fairy Morgana*, is derived from an opinion of the superstitious Sicilians, that the whole spectacle is produced by fairies, or such like visionary invisible beings. The populace are delighted whenever it appears; and run about the streets shouting for joy, calling every body out to partake of the glorious sight.

This singular meteor has been described by various authors; but the first who mentioned it with any degree of precision was Father Angelucci, whose account is thus quoted by Mr Swinburne in his *Tour through Sicily*: "On the 15th of August 1643, as I stood at my window, I was surprised with a most wonderful delectable vision. The sea that washes the Sicilian shore swelled up, and became, for ten miles in length, like a chain of dark mountains; while the waters near our Calabrian coast grew quite smooth, and in an instant appeared as one clear polished mirror, reclining against the aforesaid ridge. On this glass was depicted, in *chiaro scuro*, a string of several thousands of pilastres, all equal in altitude, distance, and degree of light and shade. In a moment they lost half their height, and bent into arcades, like Roman aqueducts. A long cornice was next formed on the top, and above it rose castles innumerable, all perfectly alike. These soon split into towers, which were shortly after lost in colonnades, then windows, and at last ended in pines, cypresses, and other trees, even and similar. This is the *Fata Morgana*, which for 26 years I had thought a mere fable."

To produce this pleasing deception, many circumstances must concur, which are not known to exist in any other situation. The spectator must stand with his back to the east, in some elevated place behind the city, that he may command a view of the whole bay; beyond which the mountains of Messina rise like a wall, and darken the back ground of the picture. The winds must be hushed, the surface quite smoothed, the tide at its height, and the waters pressed up by currents to a great elevation in the middle of the channel. All these events coinciding, as soon as the sun surmounts the eastern hills behind Reggio, and rises high enough to form an angle of 45 degrees on the water before the city, every object existing or moving at Reggio will be repeated 1000 fold upon this marine looking-glass; which, by its tremulous motion, is as it were cut into facets. Each image will pass rapidly off in succession as the day advances, and the stream carries down the wave on which it appeared. Thus the parts of this moving picture will vanish in the twinkling of an eye. Sometimes the air is at that moment so impregnated with vapours, and undisturbed by winds, as to reflect objects in a kind of aerial screen, rising about 30 feet above the level of the sea. In cloudy heavy weather, they are drawn on the surface of the water, bordered with fine prismatical colours.

To the above account we shall add the following, given by M. Houel, whose judgment and veracity render his authority highly respectable. "In fine summer days, when the weather is calm, there rises above the great

Fate

Fathemites

great current a vapour, which acquires a certain density, so as to form in the atmosphere horizontal prisms, whose sides are disposed in such a manner, that when they come to their proper degree of perfection, they reflect and represent successively, for some time (like a moveable mirror), the objects on the coast or in the adjacent country. They exhibit by turns the city and suburbs of Messina, trees, animals, men, and mountains. They are certainly beautiful aerial moving pictures. There are sometimes two or three prisms, equally perfect; and they continue in this state eight or ten minutes. After this, some shining inequalities are observed upon the surface of the prism, which render confused to the eye the objects which had been before so accurately delineated, and the picture vanishes. The vapour forms other combinations, and is dispersed in air. Different accounts have been given of this singular appearance; which for my part I attribute to a bitumen that issues from certain rocks at the bottom of the sea, and which is often seen to cover a part of its surface in the canal of Messina. The subtle parts of this bitumen being attenuated, combined, and exhaled with the aqueous globules that are raised by the air, and formed into bodies of vapour, give to this condensed vapour more confidence; and contribute, by their smooth and polished particles, to the formation of a kind of aerial crystal, which receives the light, reflects it to the eye, and transmits to it all the luminous points which colour the objects exhibited in this phenomenon, and render them visible."

FATE, (*fatum*), denotes an inevitable necessity depending upon a superior cause. The word is formed a *fando*, "from speaking:" and primarily implies the same with *effatum*, viz. a word or decree pronounced by God; or a fixed sentence whereby the Deity has prescribed the order of things, and allotted to every person what shall befall him.

The Greeks called it *εμάρτυρον*, as it were a chain or necessary series of things indissolubly linked together. It is also used to express a certain unavoidable designation of things, by which all agents, both necessary and voluntary, are swayed and directed to their ends. See NECESSITY.

In this last sense, fate is distinguished into, 1. Astrological fate, arising from the influence and position of the heavenly bodies; which (it is supposed) gave laws both to the elements and mixed bodies, and to the wills of men. 2. Stoical fate, defined by Cicero an order or series of causes, wherein, cause being linked to cause, each produces another, and thus all things flow from one prime cause. To this fate the Stoics subject even the gods.

Fate is divided by later authors into physical and divine. 1. Physical fate is an order and series of natural causes appropriated to their effects. By this fate it is that fire warms, bodies communicate motion to each other, &c. and the effects of it are all the events and phenomena of nature. 2. Divine fate is what is more usually called *Providence*. See PROVIDENCE.

FATES, in mythology. See PARCÆ.

FATHEMITES, FATEMITES, or FATHIMITES, the descendants of Mahomet by Fathema, or Fatima, his daughter. They never enjoyed the khalifat of Mecca or Bagdad, but reigned in Barbary and Egypt. See the history of these countries.

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FATHER, a term of relation denoting a person who hath begot a child. See PARENT and CHILD.

By the laws of Romulus, a father had an unlimited power over his children. Amongst the Lacedæmonians, as we learn from Aristotle's politics, the father of three children was excused from the duty of mounting guard for the security of the city; and a father of four children, was exempted from every public burden. The Poppæan law, amongst the Romans, granted many valuable privileges to the fathers of three children; amongst which one was, that he should be excused from civil offices, and that the mother should have liberty, in her father's life-time, to make a will, and manage her estate without the authority of tutors.

Natural FATHER, is he who has illegitimate children. See BASTARD; and LAW, N° clxi. 33. clxxxii. 3, 4.

Adoptive FATHER, is he who takes the children of some other, and acknowledges them as his own. See ADOPTION.

Putative FATHER, is he who is only the reputed or supposed father. Joseph was putative father of our Saviour.

FATHER-in-law, is a person married to a woman who has children by a former husband, &c. to which children he is said to be a father-in-law.

FATHER is also used in theology for the first Person in the Trinity.

FATHER is also used in a figurative sense on divers moral and spiritual occasions. Thus, it is applied to the patriarchs; as we say Adam was the father of all mankind, Abraham the father of the faithful, &c.

FATHER, in church-history, is applied to ancient authors who have preserved in their writings the traditions of the church. Thus St Chrysostom, St Basil, &c. are called *Greek fathers*, and St Augustine and St Ambrose *Latin fathers*. No author who wrote later than the 12th century is dignified with the title of *Father*.

FATHER, is also a title of honour given to prelates and dignitaries of the church, to the superiors of convents, to congregations of ecclesiastics, and to persons venerable for their age or quality. Thus we say, the right reverend father in God, the father-general of the Benedictines, the fathers of the council of Nice, father of his country, &c.

FATHERLASHER, in ichthyology. See COTRUS.

FATHOM, a long measure containing six feet, used chiefly at sea for measuring the length of cables and cordage.

FATNESS. See CORPULENCY.—It is observed, that for one fat person in France or Spain, there are an hundred in England and Holland. This is supposed to be from the use of new malt liquors, more than from the difference of climates or degrees of perspiration. Indolence may cause fatness in some few constitutions; but, in general, those who are disposed to this habit will be fat in spite of every endeavour to the contrary, but that of destroying health.

FATUARI, in antiquity, were persons who, appearing inspired, foretold things to come. The word is formed of *Fatua*, wife of the god Faunus, who was supposed to inspire women with the knowledge of futurity, as Faunus himself did the men.—Fatua had her name from *fari*, q. d. *vaticinari*, "to prophesy."

FAVISSÆ, in antiquity, were, according to Festus,

Father

Favilla.

Fauna
||
Favorinus

tus and Gellius, cisterns to keep water in: but the faviſſæ in the Capitol at Rome were dry cisterns or subterraneous cellars, where they laid up the old statues, broken vessels, and other things used in the temple. These were much the same with what, in some of the modern churches, are called the *archives* and *treasury*.

FAUNA, a deity among the Romans. She was daughter of Picus, and was originally called *Marica*. Her marriage with Faunus procured her the name of *Fauna*, and her knowledge of futurity that of *Fatua* and *Fatidica*. It is said that she never saw a man after her marriage with Faunus, and that her uncommon chastity occasioned her being ranked among the gods after death. She is the same, according to some, as *Bona Mater*.

FAUNALIA, in antiquity, Roman feasts celebrated in honour of the god Faunus, who was the same among the Romans with the *Pan* of the Greeks.

The Faunalia were held on the day of the nones of December; i. e. on the fifth day of that month. The principal sacrifice was a roe-buck; or rather, according to Horace, a kid, attended with libations of wine and burning of incense. It was properly a country festival, being performed in the fields and villages with peculiar joy and devotion. Horace gives us a very gay description thereof in the 18th ode of his third book:

—Tener pleno cadit hædus anno:
Læga nec desunt Veneris sodales
Vini crateræ: vetus ara multo
Fumat odore.

Struvius in his Roman kalendar marks the feast of Faunus on the day of the ides of February, which is the 30th day of that month; and the Faunalia he places on the fifth of the ides of December, or the 9th of that month: and in chap. ix. he shows, that there really were two Faunalia; the one in February, mentioned by Ovid, *Fast. lib. vi. ver. 246.* the other on the 9th of December, mentioned by Horace in the place just cited.

FAUNS, (FAUNI), among the ancients, were a species of demi-gods inhabiting the forests; called also *Sylvans* (*Sylvani*), and little differing from the Satyrs. They delighted more particularly in vineyards; and they generally appear as attendants of Bacchus, in the representations of Bacchanal feasts and processions. They were represented as half men, half goats, having the horns, ears, feet, and tail of a goat, a very flat nose, and the rest human. Though the Fauns were held for demi-gods, yet they were supposed to die after a long life. Arnobius shows that their father or chief, Faunus himself, only lived 120 years.

FAUNUS, (fab. hist.) a son of Picus, who reigned in Italy about 1300 years before the Augustan age. His bravery, as well as wisdom, have given rise to the tradition that he was son of Mars. His great popularity, and his fondness for agriculture, made his subjects revere him as one of their country deities after death. He was represented with all the equipage of the satyrs, and was consulted to give oracles.

FAVONIUS, among the Romans, the wind which blew directly from the west.

FAVORINUS, an ancient orator and philosopher of Gaul, who flourished under the emperor Adrian, and taught with high reputation both at Athens and

Rome. Many works are attributed to him; among the rest, a Greek miscellaneous history often quoted by Diogenes Laertius.

FAUSTUS. See *Fuſt*.

FAWKES (Francis), an ingenious poet, had his school-education at Leeds; from whence he was transplanted to Jesus-college, Cambridge, where he took the degrees in arts. Entering early into holy orders, he settled first at Bramham in Yorkshire, near the elegant seat of that name (Mr Lane's), which he celebrated in verse in 1745, in a 4to pamphlet anonymous. His first poetical publications were, *Gawen Douglas's Description of May* and *Winter modernised*. Removing afterwards to the curacy of Croydon in Surry, he recommended himself to the notice of Archbishop Herring, then resident there on account of his health, to whom besides other pieces he addressed an Ode on his recovery in 1754, printed in Mr Doddley's Collection. In consequence, his Grace collated him in 1755 to the vicarage of Orpington with St Mary Gray in Kent; and Mr Fawkes lamented his patron's death in 1757 in a pathetic Elegy styled *Aurelius*, first printed with his Grace's Seven Sermons, in 1763. He married about the same time Miss Purrier of Leeds. In April 1774, by the late Dr Plumtree's favour, he exchanged his vicarage for the rectory of Hayes. He was also one of the chaplains to the Princess Dowager of Wales. He published a volume of Poems by subscription in 8vo, 1761; the Poetical Kalendar 1763; and Poetical Magazine 1764, in conjunction with Mr Woty; Partridge-shooting, an Eclogue, to the Honourable Cha. York, 1767, 4to; and a Family Bible, with notes, in 4to, a compilation. But his great strength lay in translation, in which, since Pope, few have equalled him. Witness his fragments of Menander (in his Poems); his Works of Anacreon, Sappho, Bion, Moschus, and Musæus, 12mo, 1760; his Idylliums of Theocritus, by subscription, 8vo, 1767; and his Argonautics of Apollonius Rhodius, by subscription also (a posthumous publication, completed by the Reverend Mr Meen of Emanuel College, Cambridge), 8vo, 1780. He died August 26. 1777.

FAWN, among sportsmen, a buck or doe of the first year; or the young one of the buck's breed in its first year.

FE, *fo*, or *Fobi*, the name of the chief god of the Chinese, whom they adore as the sovereign of heaven. They represent him shining all in light, with his hands hid under his robes, to show that his power does all things invisibly. He has at his right hand the famous Confucius, and at his left Lanza or Lanca, chief of the second sect of their religion.

FEAL, a provincial term for sod or turf.

FEAL-Dikes, a cheap sort of fence common in Scotland; built with feal or sod dug up by the spade from the surface of grass-ground, consisting of the upper mould rendered tough and coherent by the matted roots of the grass thickly interwoven with it. If only a very thin bit of the upper surface is pared off with a paring spade, the pieces are called *divots*. These being of a firmer consistence, are more durable when built into dikes than feal, but much more expensive also.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds

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holds his land: by this oath the tenant holds in the freest manner, on account that all who have fee hold *per fidem et fiduciam*, that is, by fealty at the least.

This fealty, at the first creation of it, bound the tenant to fidelity, the breach of which was the loss of his fee. It has been divided into general and special: general, that which is to be performed by every subject to his prince; and special, required only of such as, in respect of their fee, are tied by oath to their lords. To all manner of tenures, except tenancy at will, and frank-almoign, fealty is incident, though it chiefly belongs to copyhold estates held in fee and for life. The form of this oath, by stat. 17 Edw. II. is to run as follows. "I A. B. will be to you my lord D. true and faithful, and bear to you faith for the lands and tenements which I hold of you; and I will truly do and perform the customs and services that I ought to do to you. So help me God."

FEAR, one of the passions of the human mind: (see PASSION). It is defined, an apprehension of impending evil, attended with a desire of avoiding it.

Fear in the extreme is called *fright* or *terror*. See FRIGHT.

FEAR, in scripture, is used in various senses.

The *fear of God* is either filial or servile. The filial fear is a holy affection or gracious habit in the soul, whereby it is inclined to obey all God's commandments, and to hate and avoid evil. Slavish or servile fear is the consequence of guilt; it is a judicial impression from the sad thoughts of the provoked majesty of heaven; it is an alarm within that disturbs the rest of a sinner. Though this fear be in wicked men, yet it often proves preparative to faith and repentance.

Fear is likewise used for the *object* of fear. Thus it is said, "the *fear* of Isaac," to describe the God whom Isaac feared, (Gen. xxxi. 42.), and in Prov. i. 26. "I will mock you when your *fear* cometh;" that is, the calamity you feared. God says, that he will send his *fear* before his people; that is, a dread wrought by him, in order to terrify and destroy the inhabitants of Canaan.

FEAR (*Metus*, *Pavor*, or *Timor*), was deified by the Pagans. Tullus Hostilius brought the worship of this deity to Rome. The Ephori of Sparta erected a temple to Fear, near their tribunal, to strike an awe into those who approached it. Fear was likewise worshipped at Corinth. The poets did not forget this imaginary deity. Virgil places her in the entrance of hell, in company with diseases, old age, &c. *Æn.* vi. 273. Ovid places her in the retinue of Tisiphone one of the furies, *Met.* iv. 483.

FEAST, or FESTIVAL, in a religious sense, is a ceremony of feasting and thanksgiving. The word is formed of the Latin *festum*, which some derive *a feriari* "to keep holiday;" others from the Greek *εστια* "1 feast or entertain," of *εστια* "hearth, fire."

Feasts, and the ceremonies thereof, have made great part of the religion of almost all nations and sects; witness those of the Greeks, Romans, Hebrews, Christians, and Mahometans.

The first feasts among the Greeks were celebrated in solemn assemblies of the whole nation, on occasion of their games, as the Olympic, the Pythian, the Isthmian, and Nemæan: in process of time they had many

others, the principal of which are enumerated in the course of this work.

The Romans also had abundance of stated feasts in honour of their deities and heroes; such were the Saturnalia, Cerealia, Lupercalia, Liberalia, Neptunalia, Consualia, Portumnalia, Vulcanalia, Palilia, Divalia, &c. See SATURNALIA, &c.

They had also feasts instituted occasionally; as Carmentalia, Quirinalia, Terminalia, Floralia, Compitalia, Lemuria, Vernalia, beside other moveable and occasional ones: as to give thanks to the gods for benefits received; to implore their assistance, or to appease their wrath, &c. as the Paganalia, Feralia, Bacchanalia, Ambarvalia, Amburbalia, Suovetaurilia, and divers others, particularly denominated *ferie*; as Sementinæ, Latinæ, &c. See each of these feasts, and *ferie* in its proper place. The feasts were divided into days of sacrifice, and days of banqueting and feasting; days of games, and days of rest or *ferie*.

There being but little history written, or at least published, in those days, one end of feasts was to keep up the remembrance of past occurrences.

The principal feasts of the Jews were the feasts of trumpets, that of the expiation, of tabernacles, of the dedication, of the passover, of pentecost, and that of purification. See EXPIATION, &c.

The modern Jews have other feasts marked in their kalendar of modern institution. The Mahometans, besides their weekly feast or sabbath, which is kept on Friday, have two solemn feasts, the first of which is called the *Feast of Victims*, and celebrated on the tenth day of the last month of their year; and the second called *Bairam*: The Chinese have two solemn feasts in the year, in memory of Confucius, besides others of less note on other days of the year.

Feasts among us are either *immoveable* or *moveable*.

Immoveable Feasts are those constantly celebrated on the same day of the year; the principal of these are Christmas-day or the Nativity, the Circumcision, Epiphany, Candlemas, or the Purification; Lady-day, or the Annunciation, called also the *Incarnation* and *Conception*; All Saints, and All Souls; besides the days of the several apostles, St Thomas, St Paul, &c. which with us are feasts, though not *ferie*. See each feast under its proper article.

Moveable Feasts are those which are not confined to the same day of the year. Of these the principal is Easter, which gives law to all the rest, all of them following, and keeping their proper distances from it; such are Palm-Sunday, Good-Friday, Ash-Wednesday, Sexagesima, Ascension-day, Pentecost, and Trinity-Sunday. See EASTER, SEXAGESIMA, PENTECOST, TRINITY, &c.

The four feasts which the English laws take special notice of are, the Annunciation of the blessed Virgin Mary or Lady-day, the 25th of March; the nativity of St John the Baptist, held on the 24th of June; the Feast of St Michael the Archangel, on the 29th of September; and that of St Thomas the Apostle, on the 21st of December: on which quarterly days rent on leases is usually reserved to be paid (5 and 6 Edw. VI. cap. 3. 3 Jac. I. cap. 1. 12 Car. II. cap. 30.)

Beside these feasts which are *general*, and enjoined by the church, there are others *local* and *occasional*,
Z 2 enjoined

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enjoined by the magistrate, or voluntarily set on foot by the people; such are the days of thanksgiving for delivery from wars, plagues, &c. Such also are the vigils or wakes in commemoration of the dedications of particular churches. See VIGIL, &c.

The prodigious increase of feast-days in the Christian church commenced towards the close of the fourth century, and was occasioned by the discovery that was then made of the remains of martyrs and other holy men, for the commemoration of whom they were established. These, instead of being set apart for pious exercises, were abused in indolence, voluptuousness, and criminal practices. Many of them were instituted on a pagan model, and perverted to similar purposes.

FEAST of Death, or Feast of Souls, a solemn religious ceremony in use among the savages of America; some of whom thus testify their respect for the deceased every eight years; and others, as the Hurons and Iroquois, every ten years.

The day of this ceremony is appointed by public order; and nothing is omitted, that it may be celebrated with the utmost pomp and magnificence. The neighbouring tribes are invited to be present, and to join in the solemnity. At this time all who have died since the last solemn occasion are taken out of their graves: those who have been interred at the greatest distance from the villages are diligently sought for, and brought to this great rendezvous of carcases.

It is not difficult to conceive the horror of this general disinterment; but it cannot be described in a more lively manner than it is done by Lafitau, to whom we are indebted for the most authentic account of those nations.

"Without question (says he), the opening of these tombs displays one of the most striking scenes that can be conceived; this humbling portrait of human misery, in so many images of death, wherein she seems to take a pleasure to paint herself in a thousand various shapes of horror, in the several carcases, according to the degree in which corruption has prevailed over them, or the manner in which it has attacked them. Some appear dry and withered; others have a sort of parchment upon their bones; some look as if they were baked and smoked, without any appearance of rottenness; some are just turning towards the point of putrefaction; whilst others are all swarming with worms, and drowned in corruption. I know not which ought to strike us most, the horror of so shocking a sight, or the tender piety and affection of these poor people toward their departed friends; for nothing deserves our admiration more than that eager diligence and attention with which they discharge this melancholy duty of their tenderness; gathering up carefully even the smallest bones, handling the carcases, disgusting as they are, with every thing loathsome, cleansing them from the worms, and carrying them upon their shoulders through tiresome journeys of several days, without being discouraged from the offensiveness of the smell, and without suffering any other emotions to arise than those of regret, for having lost persons who were so dear to them in their lives, and so lamented in their death.

"They bring them into their cottages, where they prepare a feast in honour of the dead; during which their great actions are celebrated, and all the tender

intercourses which took place between them and their friends are piously called to mind. The strangers, who have come sometimes many hundred miles to be present on the occasion, join in the tender condolence; and the women, by frightful shrieks, demonstrate that they are pierced with the sharpest sorrow. Then the dead bodies are carried from the cabins for the general reinterment. A great pit is dug in the ground, and thither, at a certain time, each person, attended by his family and friends, marches in solemn silence, bearing the dead body of a son, a father, or a brother. When they are all convened, the dead bodies, or the dust of those which were quite corrupted, are deposited in the pit: then the torrent of grief breaks out anew. Whatever they possess most valuable is interred with the dead. The strangers are not wanting in their generosity, and confer those presents which they have brought along with them for the purpose. Then all present go down into the pit, and every one takes a little of the earth, which they afterwards preserve with the most religious care. The bodies, ranged in order, are covered with entire new furs, and over these with bark, on which they throw stones, wood, and earth. Then taking their last farewell, they return each to his own cabin.

"We have mentioned, that in this ceremony the savages offer, as presents to the dead, whatever they value most highly. This custom, which is universal among them, arises from a rude notion of the immortality of the soul. They believe this doctrine most firmly, and it is the principal tenet of their religion. When the soul is separated from the body of their friends, they conceive that it still continues to hover around it, and to require and take delight in the same things with which it formerly was pleased. After a certain time, however, it forsakes this dreary mansion, and departs far westward into the land of spirits. They have even gone so far as to make a distinction between the inhabitants of the other world; some, they imagine, particularly those who in their lifetime have been fortunate in war, possess a high degree of happiness, have a place for hunting and fishing, which never fails, and enjoy all sensual delights, without labouring hard in order to procure them. The souls of those, on the contrary, who happen to be conquered or slain in war, are extremely miserable after death."

FEAST is also used for a banquet, or a sumptuous meal, without any immediate view to religion.

The use of the word, in this sense, arises hence; that a part of the ceremony of many of the ancient festivals, both those of the heathens and agapæ of the Christians, was good eating; though Mr Huet chooses to derive the word from *festinare*, which, in an ancient Latin version of Origen's Comment on Matthew, signifies "to feast:" *Ut veniens illuc Jesus festinet cum discipulis suis.*

Social or civil feasts were also expressed by the words *convivium* and *compotatio*, or *concanatio*. Cicero says, that in the Roman tongue, the word *convivium*, which means "people assembled at table," is more significant than the Greek word *compotatio* or *concanatio*: the Roman, says he, expresses the conjunction of body and mind which ought to take place at an entertainment; the Greek denotes what relates to the body alone.

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As food is necessary to our existence, it makes a bond of association among mankind. People at a feast, says one of the ancients, seem to form but one body, one soul. All nations, whether savage or civilized, have regarded the pleasures of the table as the occasion of the most agreeable society. This species of enjoyment (abstracting from its susceptibility of abuse) makes but one family of all that it brings together. It levels the distinctions introduced by policy or prejudice, and disposes men to regard one another as brethren. It is here that people feel the equality established by nature; here they forget the evils of life; they extinguish their hatred, and make their enmities cease. For this reason Aristotle considers as a breach of the social principle that custom of the Egyptians of eating apart, and praises the convivial repasts established by Minos and Lycurgus.

The Persians generally deliberated on business at table, but never determined or put their determinations in execution except in the morning before having eaten.

When the Germans, says Tacitus, wanted to reconcile enemies, to make alliances, to name chiefs, or to treat of war and peace; it was during the repast that they took counsel; a time in which the mind is most open to the impressions of simple truths, or most easily animated to great attempts. These artless people during the conviviality of the feast spoke without disguise. Next day they weighed the counsels of the former evening: they deliberated at a time when they were not disposed to feign, and took their resolution when they were least liable to be deceived.

People of rank among the Rhodians, by a fundamental law of the state, were obliged to dine daily with those who had the management of affairs, in order to deliberate with them concerning such things as were necessary or useful for the country; and on this account the principal ministers of the kingdom were obliged to keep open table for all who could be of use to the state.

Among the Romans, the place where they supped was generally the vestibule, that a more retired part of the house might not encourage licentiousness and disorder. There were several laws that restricted their meals to these vestibules.

When luxury reigned in Rome, they had superb halls for their entertainments. Lucullus had many, each of which bore the name of some deity; and this name was a mark which indicated to the servants the expence of the entertainment. The expence of a supper in Lucullus's hall of Apollo amounted to 50,000 drachmas.

The hall in which Nero feasted, by the circular motion of its walls and ceiling, imitated the revolutions of the heavens, and represented the different seasons of the year, changing at every course, and showering down flowers and perfumes on the guests.

The Romans did not, as we do, use but one table at their feasts; they had generally two; the first was for the services of animal food, which was afterwards removed, and another introduced with fruits; at this last they sung and poured out their libations. The Greeks and eastern nations had the same custom, and even the Jews in their solemn feasts and at sacrifices.

The Romans, in the time of Nero, had tables made

of citron wood brought from Mauritania; they were varnished with purple and gold, and were raised on feet of carved ivory. It is said that they were more precious than gold. Dion Cassius affirms, that Seneca had 500 of these, which he made use of one after another; and Tertullian tells us that Cicero had but one. The Romans chose the king of the feast by a throw of the dice.

We learn from Herodotus, that the ancients had neither cups nor bowls, but that they drank out of little horns tipped with silver or gold.

Under the reign of Charles V. of France, the custom of placing the lights upon the table was not yet introduced. A number of domestics held the candles in their hands during the whole time of the repast.

The Greeks and Romans kept a domestic for the purpose of reading during their meals and feasts. Sometimes the chief of the family himself performed the office of reader; and history informs us, that the Emperor Severus often read while his family ate. The time of reading was generally at supper; and guests were invited to a reading as they are now a-days to play cards.

The Greeks, in their flourishing times, did not profane, according to their own expression, the *holiness* of the table; but rather adorned it with ingenious and elegant conversation: they proposed moral topics, of which Plutarch has preserved a collection.

Ancient philosophers remark, that heroes rarely assembled convivially without bringing affairs of consequence into discourse, or deliberating upon those that regarded either present events or future contingencies.

The Scythians, while at meat, used to make the strings of their bows resound, lest their warlike virtues might be enfeebled or lost in this season of pleasure.

When Rome was corrupted with luxury, singers, dancers, musicians, stage-players, and people that told pleasant tales, were brought into the hall to amuse the guests.

Plutarch informs us, that Cæsar, after his triumphs, treated the Roman people at 22,000 tables; and by calculation it would seem that there were at these tables upwards of 200,000 persons.

At the end of the feast the Romans drank out of a large cup as often as there were letters in the name of their mistresses.

Feasting seems to have been the chief delight of the Germans, Gauls, Britons, and all the other Celtic nations; in which they indulged themselves to the utmost, as often as they had an opportunity. "Among these nations (says an author who had carefully studied their manners) there is no public assembly, either for civil or religious purposes, duly held; no birthday, marriage, or funeral properly celebrated; no treaty of peace or alliance rightly cemented, without a great feast." It was by frequent entertainments of this kind that the great men or chieftains gained the affections and rewarded the services of their followers; and those who made the greatest feasts were sure to be most popular, and to have the greatest retinue. These feasts (in which plenty was more regarded than elegance) lasted commonly several days, and the guests seldom retired until they had consumed all the provisions and exhausted all the liquors. Athenæus describes

Pelloutier
Hist. Celt.
l. 2. c. 12.
p. 463.

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scribes an entertainment that was given by Arcamnes, a very wealthy prince in Gaul, which continued a whole year without interruption; and at which all the people of Gaul, and even all strangers who passed through that country, were made welcome. At these feasts they sometimes consulted about the most important affairs of state, and formed resolutions relating to peace and war; imagining that men spoke their real sentiments with the greatest freedom, and were apt to form the boldest designs, when their spirits were exhilarated with the pleasures of the table. The conversation at these entertainments very frequently turned on the great exploits which the guests themselves or their ancestors had performed in war; which sometimes occasioned quarrels and even bloodshed. It was at a feast that the two illustrious British princes, Carbar and Oskar, quarrelled about their own bravery and that of their ancestors, and fell by mutual wounds, (*Offian*, vol. ii. p. 8, &c.)

As to the drink used at those feasts, particularly in Britain, it seems probable, that before the introduction of agriculture into the island, mead or honeydiluted with water was the only strong liquor known to its inhabitants, as it was to many other ancient nations in the same circumstances. This continued to be a favourite beverage among the ancient Britons and their posterity long after they had become acquainted with other liquors. The mead-maker was the eleventh person in dignity in the courts of the ancient princes of Wales, and took place of the physician. The following ancient law of that principality shows how much this liquor was esteemed by the British princes.—“There are three things in the court which must be communicated to the king before they are made known to any other person: 1. Every sentence of the judge; 2. Every new song; and, 3. Every cask of mead.” This was perhaps the liquor which is called by *Offian* the joy and strength of shells, with which his heroes were so much delighted.—After the introduction of agriculture, ale or beer became the most general drink of all the British nations who practised that art, as it had long been of all the Celtic people on the continent. (See *ALB*.) If the Phœnicians or Greeks imported any wine into Britain, it was only in very small quantities; that most generous liquor being very little known in this island before it was conquered by the Romans. The drinking vessels of the Gauls, Britons, and other Celtic nations were, for the most part, made of the horns of oxen and other animals; but those of the Caledonians consisted of large shells, which are still used by some of their posterity in the Highlands of Scotland.

The dishes in which the meat was served up were either of wood or earthen-ware, or a kind of baskets made of osiers. These last were most used by the Britons, as they very much excelled in the art of making them both for their own use and for exportation. The guests sat in a circle upon the ground, with a little hay, grass, or the skin of some animal under them. A low table or stool was set before each person, with the portion of meat allotted to him upon it. In this distribution, they never neglected to set the largest and best pieces before those who were most distinguished for their rank, their exploits, or their riches. Every guest took the meat set before him in his hands,

and tearing it with his teeth, fed upon it in the best manner he could. If any one found difficulty in separating any part of his meat with his hands and teeth, he made use of a large knife, that lay in a particular place for the benefit of the whole company. Servants, or young boys and girls, the children of the family, stood behind the guests ready to help them to drink or any thing they wanted.

As the ancient Britons greatly excelled and very much delighted in music, all their feasts were accompanied with the joys of song, and the music of harps. In the words of *Offian* †, “whenever the feast of shells is prepared, the songs of bards arise. The voice of sprightly mirth is heard. The trembling harps of joy are strung. They sing the battles of heroes, or the heaving breasts of love.” Some of the poems of that illustrious British bard appear to have been composed in order to be sung by the hundred bards of Fingal * at the feast of Selma. Many of the songs of the bards which were sung and played at the feast of the ancient Britons, were of a grave and solemn strain, celebrating the brave actions of the guests, or of the heroes of other times; but these were sometimes intermixed with more sprightly and cheerful airs, to which the youth of both sexes danced, for the entertainment of the company. Vol. II. p. 9. Vol. I. p. 37. * *Ibid.* Vol. I. p. 87, 209.

It has been often observed by authors, that there is no nation in the world comes near the English in the magnificence of their feasts. Those made at our coronations, instalments, consecrations, &c. transcend the belief of all foreigners; and yet it is doubted whether those now in use are comparable to those of our forefathers.

William the Conqueror, after he was peaceably settled on the throne of England, sent agents into different countries, to collect the most admired and rare dishes for his table; by which means, says John of Salisbury, this island, which is naturally productive of plenty and variety of provisions, was overflowed with every thing that could inflame a luxurious appetite. The same writer tells us, that he was present at an entertainment which lasted from three o'clock in the afternoon to midnight; at which delicacies were served up, which had been brought from Constantinople, Babylon, Alexandria, Palestine, Tripoli, Syria, and Phœnicia. These delicacies, we may presume, were very expensive. Thomas Becket, if we may believe his historian Fitz-Stephen, gave L. 5, equivalent to L. 75 at present, for one dish of eels. The sumptuous entertainments, which the kings of England, and of other countries, gave to their nobles and prelates, at the festivals of Christmas, Easter, and Whitsuntide, in which they spent a great part of their revenues, contributed very much to diffuse a taste for profuse and expensive banqueting. It was natural for a proud and wealthy baron to imitate in his own castle the entertainments he had seen in the palace of his prince. Many of the clergy too, both seculars and regulars, being very rich, kept excellent tables. The monks of St. Swithins, at Winchester, made a formal complaint to Henry II. against their abbot, for taking away three of the 13 dishes they used to have every day at dinner. The monks of Canterbury were still more luxurious: for they had at least 17 dishes every day, besides a desert; and these dishes were dressed with spices and sauces, which

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Feast. which excited the appetite as well as pleased the taste.

Great men had some kinds of provisions at their tables that are not now to be found in Britain. When Henry II. entertained his own court, the great officers of his army, with all the kings and great men of Ireland, in Dublin, at the feast of Christmas, A. D. 1171, the Irish princes and chieftains were quite astonished at the profusion and variety of provisions which they beheld, and were with difficulty prevailed upon by Henry to eat the flesh of cranes, a kind of food to which they had not been accustomed. In the remaining monuments of this period, we meet with the names of several dishes, as dellegroust, maupigyrnun, karumpie, &c. the composition of which is now unknown.

The coronation-feast of Edward III. cost L. 2835, 18 s. 2 d. equivalent to about L. 40,000 of our money. At the installation of Ralph abbot of St Augustine, Canterbury, A. D. 1309, 6000 guests were entertained with a dinner, consisting of 3000 dishes, which cost L. 287:5:0, equal in efficacy to L. 4300 in our times. "It would require a long treatise (says Matthew Paris) to describe the astonishing splendor, magnificence, and festivity with which the nuptials of Richard Earl of Cornwall, and Cincia daughter of Reimund Earl of Provence, were celebrated at London, A. D. 1243. To give the reader some idea of it, in a few words, above 30,000 dishes were served up at the marriage dinner." The nuptials of Alexander III. of Scotland, and the Princess Margaret of England, were solemnized at York, A. D. 1251, with still greater pomp and profusion. "If I attempted (says the same historian) to display all the grandeur of this solemnity,—the numbers of the noble and illustrious guests,—the richness and variety of the dresses,—the sumptuousness of the feasts,—the multitudes of the minstrels, mimicks, and others whose business it was to amuse and divert the company, those of my readers who were not present would imagine that I was imposing upon their credulity. The following particular will enable them to form a judgment of the whole. The archbishop of York made the king of England a present of 60 fat oxen, which made only one article of provision for the marriage-feast, and were all consumed at that entertainment.

The marriage-feast of Henry IV. and his queen Jane of Navarre, consisted of six courses; three of flesh and fowls, and three of fish. All these courses were accompanied and adorned with *sutleties*, as they were called. These *sutleties* were figures in pastry, of men, women, beasts, birds, &c. placed on the table, to be admired, but not touched. Each figure had a label affixed to it; containing some wise or witty saying, suited to the occasion of the feast, which was the reason they were called *sutleties*. The installation feast of George Neville, archbishop of York and chancellor of England, exceeded all others in splendor and expence, and in the number and quality of the guests. The reader may form some idea of this enormous feast from the following list of provisions prepared for it. In wheat, quarters, 300; in ale, tuns, 300; in wine, tuns, 100; in ypercrasse, pipes, 1; in oxen, 104; in wild bulls, 6; in muttons, 1000; in veals, 304; in porkes, 304; in swanns, 400; in geese, 2000; in

cappons, 1000; in pigs, 2000; in plovers, 400; in quails, 1200; in fowls called rees, 2400; in peacocks, 104; in mallards and teales, 4000; in cranes, 204; in kidds, 204; in chickens, 2000; in pigeons, 2000; in conies, 4000; in bittors, 204; in heronshaws, 400; in pheasants, 200; in partridges, 500; in woodcocks, 400; in curlews, 100; in egrits, 1000; in staggs, bucks, and roes, 500 and more; in pasties of venison, cold, 4000; in parted dishes of jellies, 1000; in plain dishes of jellies, 3000; in cold tarts, baked, 4000; in cold custards, baked, 3000; in hot pasties of venison, 1500; in hot custards, 2000; in pikes and breams, 308; in porpoises and seals, 12; spices, sugared delicates, and wafers, plenty. No turkeys are mentioned in this enormous bill of fare, because they were not then known in England. Cranes, heronshaws, porpoises, and seals, are seldom seen at modern entertainments.

One of the most expensive singularities attending the royal feasts in those days consisted in what they called *intermeats*. These were representations of battles, sieges, &c. introduced between the courses, for the amusement of the guests. The French excelled in exhibitions of this kind. At a dinner given by Charles V. of France to the emperor Charles IV. A. D. 1378, the following intermeat was exhibited: A ship with masts, sails, and rigging, was seen first; she had for colours the arms of the city of Jerusalem: Godfrey de Bouillon appeared upon deck, accompanied by several knights armed cap-a-pee: the ship advanced into the middle of the hall, without the machine which moved it being perceptible. Then the city of Jerusalem appeared, with all its towers lined with Saracens. The ship approached the city; the Christians landed, and began the assault; the besieged made a good defence: several scaling-ladders were thrown down; but at length the city was taken. Intermeats at ordinary banquets consisted of certain delicate dishes introduced between the courses, and designed rather for gratifying the taste than for satisfying hunger.

At those feasts, besides the ordinary drinks, ale and cyder, there were great quantities of wines of various kinds. Of these last, the following lines of a poet who wrote in the fourth century, contain an ample enumeration.

Ye shall have rumney and malestine,
Both ypercrasse and vernage wyne;
Mounteise and wyne of Greke,
Both algrade and despice eke,
Antioche and bastarde,
Pymment also, and garnarde,
Wyne of Greke and Muscadell,
Both clare, pymment, and Rochell.

Some of these liquors, as ypercrass, pyment, and claret, were compounded of wine, honey, and spices of different kinds, and in different proportions.

FEATHER, in physiology, a general name for the covering of birds; it being common to all the animals of this class to have their whole body, or at least the greatest part of it, covered with feathers or plumage. See ORNITHOLOGY, Sect. I. art. iv.

Feathers make a considerable article in commerce, particularly those of the ostrich, heron, swan, peacock, goose, &c. for plumes, ornaments of the head, filling of beds, writing-pens, &c.

Geese

Feast,
Feathers.

Febrifuge
||
Feciales.

• See the
article
Down.

Geese are plucked in some parts of Great Britain five times in the year; and in cold seasons many of them die by this barbarous custom, (see ANAS.)—Those feathers that are brought from Somersetshire are esteemed the best, and those from Ireland the worst.

Eider-down* is imported from Denmark; the ducks that supply it being inhabitants of Hudson's Bay, Greenland, Iceland, and Norway. Our own islands west of Scotland breed numbers of these birds, which turn out a profitable branch of trade to the poor inhabitants. Hudson's Bay also furnishes very fine feathers, supposed to be of the goose kind. The down of the swan is brought from Dantzic. The same place also sends us great quantities of the feathers of the cock and hen. The London poulterers sell a great quantity of the feathers of those birds, and of ducks and turkies: those of ducks being a weaker feather, are inferior to those of the goose; and turkies feathers are the worst of any. The best method of curing feathers is to lay them in a room, in an exposure to the sun; and when dried, to put them in bags, and beat them well with poles to get the dirt off.

FEBRIFUGE, an appellation given to such medicines as mitigate or remove a fever.

FEBRUARY, in chronology, the second month of Numa's year, and under the protection of the god Neptune. This month is not found in the kalendar of Romulus, but was added to the year by Numa. It had its name from *Februa*, *Februaca*, or *Februalis*, all names of Juno, who presided over the purifications of women; and in this month the Lupercalia were held in honour of Juno, and women were purified by the priests of Pan Lyceus at that festival. See LUPERCALIA.

February, in a common year, consists only of 28 days; but in the bissextile year it has 29, on account of the intercalary day added that year.

FECIALES, or FOECIALES, an order of priests or officers, consisting of 20 persons, among the ancient Romans, appointed to proclaim war, negotiate peace, &c.

Festus derives the word from *ferio*, "I strike;" as *ferire fedus* signifies "to conclude a treaty:" and accordingly, instead of *feciales*, he would have it written *feriales*. Others derive it from *fedus*, which was anciently written *fedus*; or from *fides*, "faith." Others from *facio*, *feci*, "I make," &c. because they made war and peace. Vossius chooses to derive it from *fatu*, of the verb *fari*, "to speak;" in which sense the *feciales* should be the same with *oratores*; which sentiment is also confirmed by the authority of Varro, who says they were called indifferently *feciales* and *oratores*.

The *feciales* were a sort of heralds, who, when the Romans had any dispute with their neighbours, were sent first to demand the thing pretended to be usurped, or require satisfaction for the injury alleged to be done. If an answer was not returned by them that was satisfactory to the people and the senate, they were dispatched again to declare war, and the like in treating of peace; the *feciales* being the only persons appointed to negotiate between the senate, &c. and the enemy.

Plutarch, in the life of Numa, and Halicarnassensis (*lib. ii.*), observe, that they were first instituted by that prince. The latter adds, that they were chosen out of the best families in Rome; that their office, which was reputed a sort of sacerdotium, or priesthood, only ended

Nº 125.

with their life; that their persons were sacred and inviolable, as those of other priests; that they were even charged to see the republic did not declare war unjustly; that they were to receive the complaints and remonstrances of nations who pretended to have been any way injured by the Romans; that if those complaints were found just, they were to seize the criminals, and deliver them up to those they had offended; that they were invested with the rights and privileges of ambassadors; that they concluded treaties of peace and alliance, and took care they were executed; and, lastly, abolished them, if they were found not to be equitable. Livy, *lib. i. cap. 24.* ascribes their institution to Ancus Martius, in the year of Rome 114.—Varro assures us, that in his time most of these functions of the *feciales* were set aside; though Plutarch observes, that they had still some authority in his time.

The *feciales* were crowned with *verbena*, "vervain," when they went to declare war. Their head was covered with a veil, over which the crown was applied. In this equipage they proceeded to the frontiers of the new enemy's country, and threw a bloody dart or javelin into the ground within the same. In Livy and other ancient authors we have the formula used in such declarations.

FECUNDITY, the same with FERTILITY.

FEE, in law, signifies a complete feudal property. Hence, where the bare life of any feudal subject is meant to be conveyed to A, and the absolute property to B, that meaning is expressed thus; "to A in life, and to B in fee." See LAW, Nº lxix. clxiv.

Fees are commonly divided into *absolute*, otherwise called *fee-simple*; and *limited*, one species of which we usually call *fee-tail*.

I. Tenant in fee-simple (or, as he is frequently styled, *tenant in fee*), is he that hath lands, tenements, or hereditaments, to hold to him and his heirs for ever; generally, absolutely, and simply; without mentioning what heirs, but referring that to his own pleasure, or to the disposition of the law. The true meaning of the word *fee* (*feodum*) is the same with that of *feud* or *fief*†, and in its original sense it is taken in contradiction to *allodium*; which latter the writers on this system.

subject define to be every man's own land, which he possesseth merely in his own right, without owing any rent or service to any superior. This is property in its highest degree; and the owner thereof hath *absolutum et directum dominium*, and therefore is said to be seized thereof absolutely in *dominio suo*, in his own demesne. But *feodum*, or *fee*, is that which is held of some superior, on condition of rendering him service; in which superior the ultimate property of the land resides. And therefore Sir Henry Spelman defines a feud or fee to be, The right which the vassal or tenant hath in lands to use the same, and take the profits thereof to him and his heirs, rendering to the lord his due services; the mere allodial property of the soil always remaining in the lord. This allodial property no subject in Britain has; it being a received and now undeniable principle in the law, that all the lands are holden mediately or immediately of the king. The king therefore only hath *absolutum et directum dominium*; but all subjects lands are in the nature of *feodum* or *fee*, whether derived to them by descent from their ancestors, or purchased for a valuable consideration: for they cannot

Fecundity
Fee.

Blackst.
Comments

† See Feodum
System.

not

not come to any man by either of those ways, unless accompanied with those feudal clogs which were laid upon the first feudatory when it was originally granted. A subject therefore hath only the usufruct, and not the absolute property, of the soil; or, as Sir Edward Coke expresses it, he hath *dominium utile*, but not *dominium directum*. And hence it is, that, in the most solemn acts of law, we express the strongest and highest estate that any subject can have, by these words, "he is seised thereof in his demesne, as of fee." It is a man's demesne, *dominium*, or property, since it belongs to him and his heirs for ever: yet this *dominium*, property, or demesne, is strictly not absolute or allodial, but qualified or feudal: it is in his demesne, *as of fee*; that is, it is not purely and simply his own, since it is held of a superior lord, in whom the ultimate property resides.

This is the primary sense and acceptance of the word *fee*. But (as Sir Martin Wright very justly observes) the doctrine, "that all lands are *holden*," having been for so many ages a fixed and undeniable axiom, the English lawyers do very rarely (of late years especially) use the word *fee* in this its primary original sense, in contradistinction to *allodium* or absolute property, with which they have no concern; but generally use it to express the continuance or quantity of estate. A *fee* therefore, in general, signifies an estate of inheritance; being the highest and most extensive interest that a man can have in a feud: and when the term is used simply, without any other adjunct, or has the adjunct of *simple* annexed to it (as, a fee, or a fee-simple), it is used in contradistinction to a fee-conditional at the common law, or a fee-tail by the statute; importing an absolute inheritance, clear of any condition, limitation, or restrictions to particular heirs, but descendible to the heirs-general, whether male or female, lineal or collateral. And in no other sense than this is the king said to be seised in fee, he being the feudatory of no man.

Taking therefore *fee* in this its secondary sense, as a state of inheritance, it is applicable to, and may be had in, any kind of hereditaments either corporeal or incorporeal. But there is this distinction between the two species of hereditaments; that of a corporeal inheritance a man shall be said to be seised in his demesne, *as of fee*; of an incorporeal one he shall only be said to be seised *as of fee*, and not in his demesne. For as incorporeal hereditaments are in their nature collateral to, and issue out of, lands and houses, their owner hath no property, *dominium*, or demesne, in the thing itself, but hath only something derived out of it; resembling the *servitudes*, or services, of the civil law. The *dominium*, or property, is frequently in one man, while the appendage or service is in another. Thus Gaius may be seised *as of fee*, of a way going over the land, of which Titius is seised in his demesne *as of fee*.

The fee-simple or inheritance of lands and tenements is generally vested and resides in some person or other; though divers inferior estates may be carved out of it. As if one grants a lease for 21 years, or for one or two lives, the fee-simple remains vested in him and his heirs; and after the determination of those years or lives, the land reverts to the grantor or his heirs, who shall hold it again in fee-simple. Yet sometimes the fee may be in abeyance, that is (as the word signifies) in expectation, remembrance, and contemplation in law; there

being no person in *esse*, in whom it can vest and abide, though the law considers it as always potentially existing, and ready to vest whenever a proper owner appears. Thus, in a grant to John for life, and afterwards to the heirs of Richard, the inheritance is plainly neither granted to John nor Richard, nor can it vest in the heirs of Richard till his death, *nam nemo est hæres viventis*: it remains therefore in waiting, or abeyance, during the life of Richard. This is likewise always the case of a parson of a church, who hath only an estate therein for the term of his life; and the inheritance remains in abeyance. And not only the fee, but the freehold also, may be in abeyance; as, when a parson dies, the freehold of his glebe is in abeyance until a successor be named, and then it vests in the successor.

The word *heirs* is necessary in the grant or donation in order to make a fee or inheritance. For if land be given to a man for ever, or to him and his assigns for ever, this vests in him but an estate for life. This very great nicety about the insertion of the word *heirs* in all feoffments and grants, in order to vest a fee, is plainly a relic of the feudal strictness: by which it was required, that the form of the donation should be punctually pursued; or that, as Craig expresses it, in the words of Baldus, *donationes sint stricti juris, ne quis plus donasse presumatur quam in donatione expresserit*. And therefore, as the personal abilities of the donee were originally supposed to be the only inducements to the gift, the donee's estate in the land extended only to his own person, and subsisted no longer than his life; unless the donor, by an express provision in the grant, gave it a longer continuance, and extended it also to his heirs. But this rule is now softened by many exceptions.

For, 1. It does not tend to devise by will; in which, as they were introduced at the time when the feudal rigour was apace wearing out, a more liberal construction is allowed: and therefore by a devise to a man for ever, or to one and his assigns for ever, or to one in fee-simple, the devisee hath an estate of inheritance; for the intention of the deviser is sufficiently plain from the words of perpetuity annexed, though he hath omitted the legal words of inheritance. But if the devise be to a man and his assigns, without annexing words of perpetuity, there the devisee shall take only an estate for life; for it does not appear that the deviser intended any more. 2. Neither does this rule extend to fines or recoveries, considered as a species of conveyance; for thereby an estate in fee passes by act and operation of law without the word *heirs*: as it does also, for particular reasons, by certain other methods of conveyance, which have relation to a former grant or estate, wherein the word *heirs* was expressed. 3. In creations of nobility by writ, the peer so created hath an inheritance in his title, without expressing the word *heirs*; for they are implied in the creation, unless it be otherwise specially provided: but in creations by patent, which are *stricti juris*, the word *heirs* must be inserted, otherwise there is no inheritance. 4. In grants of lands to sole corporations and their successors, the word *successors* supplies the place of *heirs*; for as heirs take from the ancestor, so doth the successor from the predecessor. Nay, in a grant to a bishop, or other sole spiritual corporation, in *frankalmoign*, the word *frankalmoign* supplies the place of *successors* (as the word *successors* supplies the place of

A a

heirs)

Fee.

heirs) *ex vi termini*; and in all these cases a fee-simple vests in such sole corporation. But, in a grant of lands to a corporation aggregate, the word *successors* is not necessary, though usually inserted: for, albeit such simple grant be strictly only an estate for life, yet as that corporation never dies, such estate for life is perpetual, or equivalent to a fee-simple, and therefore the law allows it to be one. Lastly, in the case of the king, a fee-simple will vest in him, without the word *heirs* or *successors* in the grant; partly from prerogative royal, and partly from a reason similar to the last, because the king, in judgment of law, never dies. But the general rule is, that the word *heirs* is necessary to create an estate of inheritance.

II. We are next to consider limited fees, or such estates of inheritance as are clogged and confined with conditions or qualifications of any sort. And these we may divide into two sorts: 1. *Qualified*, or *base fees*; and, 2. *Fees conditional*, so called at the common law; and afterwards *fees-tail*, in consequence of the statute *de donis*.

1. A *BASE* or qualified fee, is such a one as has a qualification subjoined thereto, and which must be determined whenever the qualification annexed to it is at an end. As, in the case of a grant to A and his heirs, tenants in the manor of Dale; in this instance, whenever the heirs of A cease to be tenants of that manor, the grant is entirely defeated. So, when Henry VI. granted to John Talbot, lord of the manor of Kingston-Lisse in Berks, that he and his heirs, lords of the said manor, should be peers of the realm, by the title of *barons of Lisse*; here John Talbot had a base or qualified fee in that dignity; and the instant he or his heirs quitted the seigniorship of this manor, the dignity was at an end. This estate is a fee, because by possibility it may endure for ever in a man and his heirs; yet as that duration depends upon the concurrence of collateral circumstances, which qualify and debase the purity of the donation, it is therefore a qualified or base fee.

2. As to *fees-conditional*, or *fees-tail*, see the article *TAIL*.

FEE also signifies a certain allowance to physicians, barristers, attorneys, and other officers, as a reward for their pains and labour.

If a person refuse to pay an officer his due fees, the court will grant an attachment against him, to be committed till the fees are paid; and an attorney may bring an action of the case for his fees against the client that retained him in his cause.

FEE also denotes a settled perquisite of public officers, payable by those who employ them.

The fees due to the officers of the custom-house, are expressly mentioned in a schedule, or table, which is hung up in public view in the said office, and in all other places where the said fees are to be paid or received. And if any officer shall offend, by acting contrary to the regulations therein contained, he shall forfeit his office and place, and be for ever after incapable of any office in the custom-house.

The other public offices have likewise their settled fees, for the several branches of business transacted in them.

FEE-Farm, a kind of tenure without homage, fealty, or other service, except that mentioned in the feoff-

ment; which is usually the full rent, or at least a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffor and his heirs may have an action for the recovery of the lands.

FEELERS, in natural history, a name used by some for the horns of *INSECTS*.

FEELING, one of the five external senses, by which we obtain the ideas of solid, hard, soft, rough, hot, cold, wet, dry, and other tangible qualities. See *ANATOMY*, n° 138.

FEET. See *FOOT*.

FEET-Bearer, the name of an officer in the courts of the ancient Anglo-Saxon and Welch kings. He was a young gentleman whose duty it was to sit on the floor, with his back towards the fire, and hold the king's feet in his bosom all the time he sat at table, to keep them warm and comfortable†: A piece of state and luxury unknown in modern times.

FEINT, in fencing, a show of making a thrust at one part, in order to deceive the enemy, that you may really strike him in another.

A simple feint is a mere motion of the wrist, without stirring the foot.

FELAPTON, in logic, one of the six first modes of the third figure of syllogisms; whereof the first proposition is an universal negative, the second an universal affirmative, and the third a particular negative.

FELIBIEN (Andre), was born at Chartres in 1619, and went secretary under the marquis de Fontenay Mareuil ambassador to the court of Rome in 1647. On his return, M. Colbert procured him the places of historiographer to the king, superintendant of his buildings, and of the arts and manufactures in France. He became afterwards deputy comptroller-general of the bridges and dykes in that kingdom; and died in 1695. He wrote several pieces relating to the fine arts; the principal of which is his "Dialogues on the lives and works of the most eminent painters."

FELICITAS, (*FELICITY*, or *HAPPINESS*), was deified by the ancient Pagans. Lucullus built a temple to her. She had another erected by Lepidus. The Greeks paid divine worship to *Macaria*, daughter of Hercules, the same with *Felicitas*. This deity is often pictured upon medals, and generally with a Cornucopia in one hand and a Caduceus in the other. The inscriptions are, *Felicitas Temporum*, *Felicitas Augusti*, *Felicitas Publica*, &c.

FELIS, in zoology, a genus of quadrupeds belonging to the order of *feræ*, the characters of which are these: The fore-teeth are equal; the molares or grinders have three points; the tongue is furnished with rough sharp prickles, and pointing backwards; and the claws are sheathed and retractile. This genus comprehends twenty-one species, *viz.*

I. The *Leo*, or *LION*. The largest lions are from eight to nine feet in length, and from four to six feet high: those of a smaller size are generally about 5½ feet long, and about 3½ high. His head is very thick, and his face is beset on all sides with long bushy yellowish hair; this shaggy hair extends from the top of the head to below the shoulders, and hangs down to his knees: the belly and breast are likewise covered with long

Feelers
||
Felis.

† *Leges Wallicæ*, p. 58.

See Plates
CXCI. and
CXCH.

Lion.

Felis.

long hair. The rest of the body is covered with very short hair, excepting a bush at the point of the tail. The ears are roundish, short, and almost entirely concealed under the hair of his front. The shagginess of the fore-part of his body makes the hinder-part have a naked appearance. The tail is long and very strong; the legs are thick and fleshy; and the feet are short; the length of the claws is about an inch and a quarter, are of a whitish colour, very crooked, and can be extended or retracted into the membranous sheath at pleasure: their points are seldom blunted, as they are never extended but when he seizes his prey.

The female, or lioness, has no mane, or long hair about her head or shoulders; in her we see distinctly the whole face, head, ears, neck, shoulders, breast, &c. all these parts being in some measure concealed under the long hair of the male, give the female a very different appearance: besides, she is considerably less than the male. The hair of both male and female is of a yellowish colour, and whitish on the sides and belly.

In warm countries, quadrupeds in general are larger and stronger than in the cold or temperate climates. They are likewise more fierce and hardy; all their natural qualities seem to correspond with the ardour of the climate. The lions nourished under the scorching sun of Africa or the Indies, are the most strong, fierce, and terrible. Those of mount Atlas, whose top is sometimes covered with snow, are neither so strong nor so ferocious as those of Biledulgerid or Zaara, whose plains are covered with burning sand. It is in these hot and barren deserts, that the lion is the dread of travellers, and the scourge of the neighbouring provinces. But it is a happy circumstance that the species is not very numerous: they even appear to diminish daily. The Romans, says Mr Shaw, brought many more lions out of Libya for their public shows, than are now to be found in that country. It is likewise remarked, that the lions in Turkey, Persia, and the Indies, are less numerous than formerly. As this formidable and courageous animal makes a prey of most other animals, and is himself a prey to none, this diminution in the number of the species can be owing to nothing but an increase in the number of mankind: for it must be acknowledged, that the strength of this king of animals is not a match for the dexterity and address of a negro or Hottentot, who will often dare to attack him face to face, and with very slight weapons.

The ingenuity of mankind augments with their number; that of other animals continues always the same. All the noxious animals, as the lion, are reduced to a small number, not only because mankind are become more numerous, but likewise because they have become more ingenious, and have invented weapons which nothing can resist. This superiority in the numbers and industry of mankind, at the same time that it has broke the vigour of the lion, seems likewise to have enervated his courage. This quality, though natural, is exalted or lowered according to the good or bad success with which any animal has been accustomed to employ his force. In the vast deserts of Zaara; in those which seem to separate two very different races of men, the Negroes and Moors, between Senegal and the boundaries of Mauritania; in those

uninhabited regions above the country of the Hottentots; and, in general, all the meridional parts of Africa and Asia, where mankind have disdained to dwell, lions are still as numerous and as ferocious as ever. Accustomed to measure their strength by that of all other animals which they encounter, the habit of conquering renders them haughty and intrepid. Having never experienced the strength of man, or the power of his arms, instead of discovering any signs of fear, they disdain and set him at defiance. Wounds irritate, but do not terrify them: they are not even disconcerted at the sight of numbers. A single lion of the desert has been known to attack a whole caravan; and if, after a violent and obstinate engagement, he found himself weakened, he retreats fighting, always keeping his face to the enemy. On the other hand, the lions which live near the villages or huts of the Indians or Africans, being acquainted with man and the force of his arms, are so dastardly as to fly and leave their prey at the sight of women or children.

This softening in the temper and disposition of the lion, shows that he is capable of culture, and susceptible, at least to a certain degree, of the impressions that he receives: accordingly, history informs us of lions yoked in triumphal chariots, trained to war, or the chase; and that, faithful to their masters, they never employed their strength or courage but against their enemies. It is certain, that a lion taken young, and brought up among domestic animals, will easily be accustomed to live and sport with them; that he is mild and caressing to his master, especially when he is young; and that, if his natural ferocity sometimes breaks out, it is rarely turned against those who have been kind to him. But, as his passions are impetuous and vehement, it is not to be expected that the impressions of education will at all times be sufficient to balance them: for this reason it is dangerous to let him suffer hunger long, or to vex him by ill-timed teazings: bad treatment not only irritates him, but he remembers it long, and meditates revenge. On the other hand, he is exceedingly grateful, and seldom forgets benefits received. He has been often observed to disdain weak or insignificant enemies, to despise their insults, and to pardon their offensive liberties. When led into captivity, he will discover symptoms of uneasiness, without anger or peevishness: on the contrary, his natural temper softens, he obeys his master, caresses the hand that gives him food, and sometimes gives life to such animals as are thrown to him alive for prey: by this act of generosity he seems to consider himself as for ever bound to protect them; he lives peaceably with them; allows them a part, and sometimes the whole, of his food; and will rather submit to the pangs of hunger, than fill his stomach with the fruit of his beneficence. We may likewise observe, that the lion is not a cruel animal: he kills rather from necessity than choice, never destroying more than he eats; and whenever his appetite is satisfied, he is mild and peaceable. For his ordinary subsistence, he requires about 15 pounds of raw flesh each day.

The aspect of the lion corresponds with the noble and generous qualities of his mind. His figure is respectable; his looks are determined; his gait is stately, and his voice tremendous. In a word, the body of the lion appears to be the best model of strength

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joined to agility. The force of his muscles is expressed by his prodigious leaps and bounds, often 20 feet at once; by the brisk motion of his tail, a single sweep of which is sufficient to throw a man to the ground; by the ease with which he moves the skin of his face, and particularly of his forehead; and, lastly, by the faculty of erecting and agitating the hair of his mane when irritated.

Lions are very ardent in their amours: when the female is in season, she is often followed by eight or ten males; who roar incessantly, and enter into furious engagements, till one of them completely overcomes the rest, takes peaceable possession of the female, and carries her off to some secret recess. The lioness brings forth her young in the spring, and produces but once every year.

All the passions of the lion, the soft passion of love not excepted, are excessive; the love of offspring is extreme: the lioness is naturally weaker, less bold, and more gentle than the lion; but she becomes perfectly rapacious and terrible when she has young. Then she exhibits more courage than the male; she regards no danger: she attacks indifferently men and all other animals, kills them, and carries them to her young ones, whom she thus early instructs to suck their blood and tear their flesh. She generally brings forth in the most secret and inaccessible places; and, when afraid of a discovery, she endeavours to conceal the traces of her feet, by returning frequently on her steps, or rather by effacing them with her tail; and, when the danger is great, she carries off her young, and conceals them somewhere else. But, when an actual attempt is made to deprive her of her young, she becomes perfectly furious, and defends them till she be torn to pieces.

The lion seldom goes abroad in the middle of the day; but sallies forth in the evening and night in quest of prey. He is afraid of fire, and seldom or never approaches the artificial fires made by the shepherds for the protection of their flocks; he does not trace other animals by the scent, but is obliged to trust to his eyes. Many historians have even misrepresented him as incapable of finding out his prey; but that he is obliged to the jackal, an animal of exquisite scent, in order to provide for him, and that this animal either accompanies or goes before him for this purpose. The jackal is a native of Arabia, Libya, &c. and, like the lion, lives upon prey: perhaps sometimes he follows the lion, but it is with a view to pick up what he leaves behind, not to provide for him; for, being a small and feeble animal, he ought rather to fly from than to serve the lion.

The lion, when hungry, will attack any animal that presents itself: but he is so very formidable, that all endeavour to avoid his rencounter; this circumstance often obliges him to conceal himself, and lie in wait till some animal chances to pass. He lies squat on his belly in a thicket; from which he springs with such force and velocity, that he often seizes them at the first bound. He endures hunger longer than thirst; he seldom passes water without drinking, which he does by lapping like a dog. In burning deserts, where rivers and fountains are denied, they live in a perpetual fever, a sort of madness fatal to every animal they

meet with. The author of the *Oeconomy of Nature* gives a wonderful proof of the instinct of these animals in those unwatered tracts. There the pelican makes her nest; and in order to cool her young ones, and accustom them to an element they must afterwards be conversant in, brings from afar, in their great gular pouch, sufficient water to fill the nest: the lion, and other wild beasts, approach and quench their thirst; yet never injure the unfledged birds, as if conscious that their destruction would immediately put a stop to those grateful supplies.

The roaring of the lion, which is strong and loud, is his ordinary voice; but when he is irritated, his cry is shorter, repeated more suddenly, and is still more terrible than the roaring: besides, he beats his sides with his tail, stamps with his feet, erects and agitates the hair of his head and mane, moves the skin of his face, shows his angry teeth, and lolls out his tongue.

The roaring of the lion, according to Mr Sparman, "consists in a hoarse inarticulate sound, which at the same time seems to have a hollowness in it, something like that proceeding from a speaking trumpet. The sound is between that of a German *u* and an *o*, being drawn to a great length, and appearing as if it came from out of the earth; at the same time that, after listening with the greatest attention, I could not exactly hear from what quarter it came. The sound of the lion's voice does not bear the least resemblance to thunder, as M. de Buffon, tom. ix. p. 22. from the *Voyage of Boullaye le Gouz*, affirms it does. In fact, it appeared to me to be neither peculiarly piercing nor tremendous; yet, from its slow prolonged note, joined with nocturnal darkness, and the terrible idea one is apt to form to one's self of this animal, it made one shudder, even in such places as I had an opportunity of hearing it in with more satisfaction, and without having the least occasion for fear. We could plainly perceive by our cattle when the lions, whether they roared or not, were reconnoitring us at a small distance. For in that case the hounds did not dare to bark in the least, but crept quite close to the Hottentots; and our oxen and horses sighed deeply, frequently hanging back, and pulling slowly with all their might at the strong straps with which they were tied up to the waggon. They likewise laid themselves down upon the ground and stood up alternately, appearing as if they did not know what to do with themselves: or rather just as if they were in the agonies of death. It is, indeed, a wonderful circumstance (continues our author), that the brute creation should have been taught merely by nature to be in dread of the lion; for our horses and oxen were all from places where I am certain they could have no knowledge of this dreadful adversary of theirs; so that in this we must admire the bounty of Providence, which, while it has sent such a tyrant as the lion amongst the animal creation, has likewise taught them to discern and distinguish it with trembling and horror."

The gait of the lion is stately, grave, and slow, tho' always in an oblique direction. His movements are not equal or measured, but consist of leaps and bounds; which prevents him from stopping suddenly, and makes him often overleap his mark. When he leaps upon his

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his prey, he makes a bound of 12 or 15 feet, falls above it, seizes it with his fore-feet, tears the flesh with his claws, and then devours it with his teeth. If he chances to miss his leap, he will not, as the Hottentots unanimously assured Mr Sparman, follow his prey any farther; but, as though he were ashamed, turning round towards the place where he lay in ambush, slowly, and step by step, as it were, measures the exact length between the two points, in order to find how much too short of, or beyond, the mark he had taken his leap.

One would suppose that the roaring of the lion would prove serviceable to the other animals, as being a warning for them to betake themselves to flight; but as when he roars, according to all report, he puts his mouth to the ground, so that the sound is diffused equally all over the place, without, as we have already mentioned, its being possible to hear from what quarter it comes, the animals are intimidated and scared to such a degree, as to fly about backwards and forwards in the dark to every side; in consequence of which, they often chance to run on to the very spot from whence the sound actually proceeds, and which they meant most to avoid.

Dr Sparman, in his account of the lion, detracts considerably from the character of courage and generosity generally ascribed to that animal. "It is not in magnanimity (says he), as many will have it to be, but in an insidious and cowardly disposition, blended with a certain degree of pride, that the general character of the lion consists; though hunger must naturally have the effect of now and then inspiring so strong and nimble an animal with uncommon intrepidity and courage. Moreover, being accustomed always itself to kill its own food, and that with the greatest ease, as meeting with no resistance, and even frequently to devour it reeking and weltering in its blood, it cannot but be easily provoked, and acquire a greater turn for cruelty than for generosity: but, on the other hand, not being accustomed to meet with any resistance, it is no wonder that, when it does, it should sometimes be faint-hearted and crest-fallen. A yeoman, a man of veracity (Jacob Kok, of Zeekoe-river), related to me an adventure he had in these words:—One day walking over his lands with his loaded gun, he unexpectedly met with a lion. Being an excellent shot, he thought himself pretty certain, in the position he was in, of killing it, and therefore fired his piece. Unfortunately he did not recollect, that the charge had been in it for some time, and consequently was damp; so that his piece hung fire, and the ball falling short, entered the ground close to the lion. In consequence of this he was seized with a panic, and took directly to his feet; but being soon out of breath, and closely pursued by the lion, he jumped up on a little heap of stones, and there made a stand, presenting the butt-end of his gun to his adversary, fully resolved to defend his life as well as he could to the utmost. My friend did not take upon him to determine, whether this position and manner of his intimidated the lion or not: it had, however, such an effect upon the creature, that it likewise made a stand; and what was still more singular, laid itself down at the distance of a few paces from the heap of stones seemingly quite unconcerned. The sportsman, in the mean while, did not dare to stir a step from the spot: be-

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hides, in his flight, he had the misfortune to lose his powder-horn. At length, after waiting a good half hour, the lion rose up, and at first went very slowly, and step by step, as if it had a mind to steal off; but as soon as it got to a greater distance, it began to bound away at a great rate."

Our author also relates the following occurrence, as serving to show the cowardice and insidious disposition of the lion. "An elderly Hottentot in the service of a Christian, near the upper part of Sunday river on the Cambdebo side, perceived a lion following him at a great distance for two hours together. Thence he naturally concluded, that the lion only waited for the approach of darkness, in order to make him his prey: and in the mean time, could not expect any other than to serve for this fierce animal's supper, inasmuch as he had no other weapon of defence than a stick, and knew that he could not get home before it was dark. But as he was well acquainted with the nature of the lion, and the manner of its seizing upon its prey, and at the same time had leisure between whiles to ruminate on the ways and means in which it was most likely that his existence would be put an end to, he at length hit on a method of saving his life. For this purpose, instead of making the best of his way home, he looked out for a *kilperans* (so they generally call a rocky place level and plain at top, and having a perpendicular precipice on one side of it), and sitting himself down on the edge of one of these precipices, he found, to his great joy, that the lion likewise made a halt, and kept the same distance as before. As soon as it grew dark, the Hottentot sliding a little forwards, let himself down below the upper edge of the precipice upon some projecting part or cleft of the rock, where he could just keep himself from falling. But in order to cheat the lion still more, he set his hat and cloak on the stick, making with it at the same time a gentle motion just over his head, and a little way from the edge of the mountain. This crafty expedient had the desired success. He did not stay long in that situation, before the lion came creeping softly towards him like a cat, and mistaking the skin-cloak for the Hottentot himself, took his leap with such exactness and precision, as to fall headlong down the precipice, directly close to the snare which had been set up for him; when the Hottentot is said, in his great joy, exultingly to have called out *!kafsi!* an interjection of very extensive import and signification."

This is not the only instance of lions in Africa being ensnared in the midst of their leap. In the out-houses and waste grounds about farms, where a lion has been upon the watch for some animal and missed it, or where they have other reasons to expect him, they set up the figure of a man close by the side of several loaded guns; so that these discharge themselves into the body of the beast at the very instant that he springs or throws himself upon the dressed figure. As this is done with so much ease and success, and as they hardly ever think it worth while in Africa to take lions alive, they seldom give themselves the trouble of catching them by means of pit-falls.

"It is singular (Dr Sparman remarks), that the lion, which, according to many, always kills his prey immediately if it belongs to the brute creation, is reported frequently, although provoked, to content him-

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self with merely wounding the human species; or at least to wait some time before he gives the fatal blow to the unhappy victim he has got under him. In several places through which I passed, they mentioned to me by name a father and his two sons, who were said to be still living, and who being on foot near a river on their estate in search of a lion, this latter had rushed out upon them, and thrown one of them under feet: the two others, however, had time enough to shoot the lion dead upon the spot, which had lain almost across the youth so nearly and dearly related to them, without having done him any particular hurt. I myself saw, near the upper part of Duyven-hoek-river, an elderly Hottentot, who at that time (his wounds being still open) bore under one eye and underneath his cheek-bone the ghastly marks of the bite of a lion, which did not think it worth his while to give him any other chastisement for having, together with his master (whom I also knew) and several other Christians, hunted him with great intrepidity, though without success. The conversation ran every where in this part of the country upon one Bota, a farmer and captain in the militia, who had lain for some time under a lion, and had received several bruises from the beast, having been at the same time a good deal bitten by him in one arm, as a token to remember him by; but, upon the whole, had in a manner had his life given him by this noble animal. The man was said then to be living in the district of Artaquas-kloof. I do not rightly know how to account for this merciful disposition towards mankind. Does it proceed from the lion's greater respect and veneration for man, as being equal to, or even a mightier tyrant than, himself among the animal creation? or is it merely from the same caprice which has sometimes indulged him not only to spare the lives of men or brute creatures who have been given up to him for prey, but even to caress them, and treat them with the greatest kindness? Whims and freaks of this kind have perhaps in a great measure acquired the lion the reputation it has for generosity; but I cannot allow this specious name, sacred only to virtue, to be lavished upon a wild beast. Slaves, indeed, and wretches of servile minds, are wont with this attribute to flatter their greatest tyrants; but with what show of reason can this attribute be bestowed upon the most powerful tyrant among quadrupeds, because it does not exercise an equal degree of cruelty upon all occasions? That the lion does not, like the wolf, tiger, and some other beasts of prey, kill a great deal of game or cattle at one time, perhaps proceeds from this, that while he is employed in attacking one or two of them, the remainder fly farther than it accords with the natural indolence of this beast to follow them. If this be called *generosity*, a cat may be styled generous with respect to the rats; as I have seen this creature in the fields among a great number of the latter, where she could have made a great havoc at once, seize on a single one only, and run off with it. The lion and the cat, likewise, very much resemble each other, in partly sleeping out, and partly passing away in a quiet inactive state, a great part of their time, in which hunger does not urge them to go in quest of their prey."

The lion's strength, as already observed, is very great. Mr Sparman informs us, that "this animal

was once seen at the Cape to take an heifer in his mouth, and though the legs of this latter dragged on the ground, yet seemed to carry her off with the same ease as a cat does a rat. It likewise leaped over a broad dike with her, without the least difficulty. A buffalo perhaps would be too cumbersome for this beast of prey, notwithstanding his strength, to seize and carry off with him in the manner above mentioned. Two yeomen, upon whose veracity I can place some confidence, gave me the following account relative to this matter. Being a hunting near Boshiesman-river with several Hottentots, they perceived a lion dragging a buffalo from the plain to a neighbouring woody hill. They, however, soon forced it to quit its prey, in order to make a prize of it themselves; and found that this wild beast had had the sagacity to take out the buffalo's large and unwieldy entrails in order to be able the easier to make off with the fleshy and more eatable part of the carcase. The lion's strength, however, is said not to be sufficient alone to get the better of so large and strong an animal as the buffalo; but, in order to make it his prey, this fierce creature is obliged to have recourse both to agility and stratagem; insomuch, that stealing on the buffalo, it fastens with both its paws upon the nostrils and mouth of the beast, and keeps squeezing them close together, till at length the creature is strangled, wearied out, and dies. A certain colonist, according to report, had had an opportunity of seeing an attack of this kind; and others had reason to conclude, that something of this nature had passed, from seeing buffaloes, which had escaped from the clutches of lions, and bore the marks of the claws of these animals about their mouth and nose. They asserted, however, that the lion itself risked its life in such attempts, especially if any other buffalo was at hand to rescue that which was attacked. It was said, that a traveller once had an opportunity of seeing a female buffalo with her calf, defended by a river at her back, keep for a long time at bay five lions which had partly surrounded her; but did not, at least as long as the traveller looked on, dare to attack her. I have been informed, from very good authority, that on a plain to the east of Kromme-river, a lion had been gored and trampled to death by a herd of cattle; having, urged probably by hunger, ventured to attack them in broad day-light." This the reader will, perhaps, not so much wonder at, when he is told, that in the day-time, and upon an open plain, 12 or 16 dogs will easily get the better of a large lion. Nor is there any necessity, Dr Sparman says, for the dogs with which the lion is to be hunted to be very large and trained up to the sport, as M. Buffon thinks they should be, the business being perfectly well accomplished with the common farm-house dogs. When these have got pretty near the lion, the latter, from a greatness of soul, does not offer to fly any farther, but sits himself down. The hounds then surround him, and rushing on him all at once, are thus, with their united strength, able to tear in pieces, almost in an instant, the strongest of all wild beasts. It is said, that he has seldom time to give more than two or three slight strokes with his paws (each of which strokes is instant death) to an equal number of his assailants. M. de Buffon asserts also, that the lion may be hunted on horseback, but that the horses as well as the dogs

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It is said, that horses in battle, or in other dangerous enterprizes, suffer themselves more willingly to be caparisoned by their riders than at other times. This circumstance Dr Sparman likewise remarked in these animals on the above expeditions. "Our horses (says he), the very same as had several times, in the manner above mentioned, shown their disquietude when the lion happened to be in the vicinity of them, and which were not in the least trained to the chase, once exhibited a spirit in the pursuit of two large lions, equal to that which they had shown at other times in chasing the timid gazels; though, in fact, hunting horses seem to partake much more of their master's pleasure in the chase. I remember, in particular, at Agter Bruntjes Hoogte, I rode a horse, which, by a tremulous sound issuing from its chest, cocking up its ears, and prancing and capering, discovered, in an unequivocal manner, its ardour for the chase, whenever it came in sight of the larger kind of game. There have ever been instances of hunting horses, who, when the hunter has jumped off their backs in order to discharge his piece, but has missed his mark, have in their eagerness for the chase, not allowed him time sufficient to mount again, but followed the game alone for hours together, close at its very heels, in all its turnings and windings."

The chase of the lion on horseback is carried on at the Cape in the following manner, as described by Dr Sparman.

"It is only on the plains that the hunters venture to go out on horseback in this chase. If the lion keeps in some coppice or wood, on a rising ground, they endeavour to seize it with dogs till it comes out; they likewise prefer going together two or more in number, in order to be able to assist and rescue each other, in case the first shot should not take place. When the lion sees the hunters at a great distance, it is universally allowed that he takes to his heels as fast as ever he can, in order to get out of their sight; but if they chance to discover him at a small distance from them, he is then said to walk off in a surly manner, but without putting himself in the least hurry, as though he was above showing any fear, when he finds himself discovered or hunted. He is therefore reported likewise, when he finds himself pursued with vigour, to be soon provoked to resistance, or at least he disdains any longer to fly. Consequently he slackens his pace, and at length only slides slowly off, step by step, all the while eying his pursuers askant; and finally makes a full stop, and turning round upon them, and at the same time giving himself a shake, roars with a short and sharp tone, in order to show his indignation, being ready to seize on them, and tear them in pieces. This is now precisely the time for the hunters to be upon the spot, or else to get as soon as possible within a certain distance of him, yet so as at the same time to keep a proper distance from each other; and he that is nearest, or is most advantageously posted, and has the best mark of that part of the lion's body which contains his heart and lungs, must be the first to jump off his horse, and, securing the bridle by putting it round his arm, discharge his piece; then in an instant reco-

vering his seat, must ride obliquely athwart his companions; and, in fine, giving his horse the reins, must trust entirely to the speed and fear of this latter, to convey him out of the reach of the fury of the wild beast, in case he has only wounded him, or has absolutely missed him. In either of these cases, a fair opportunity presents itself for some of the other hunters to jump off their horses directly, as they may then take their aim and discharge their pieces with greater coolness and certainty. Should this shot likewise miss (which, however, seldom happens), the third sportsman rides after the lion, which at that instant is in pursuit of the first or the second, and, springing off his horse, fires his piece, as soon as he has got within a proper distance, and finds a sufficiently convenient part of the animal present itself, especially obliquely from behind. If now the lion turns upon him too, the other hunters turn again, in order to come to his rescue with the charge which they loaded with on horseback, while they were flying from the wild beast. No instance has ever been known of any misfortune happening to the hunters in chasing the lion on horseback. The African colonists, who are born in, or have had the courage to remove into the more remote parts of Africa, which are exposed to the ravages of wild beasts, are mostly good marksmen, and are far from wanting courage. The lion that has the boldness to seize on their cattle, which are the most valuable part of their property, sometimes at their very doors, is as odious to them as he is dangerous and noxious. They consequently seek out these animals, and hunt them with the greatest ardour and glee, with a view to exterminate them."

II. The *Tigris*, or TIGER. The size of this animal, according to some authors, is larger, and, according to others, somewhat less, than the lion. M. de la Landemagon assures us, that he has seen a tiger in the East Indies 15 feet long, including undoubtedly the length of the tail, which, supposing it to be four feet, makes the body of the tiger about 11 feet in length. The skeleton preserved in the cabinet of the French king, indicates that the animal was about seven feet long from the point of the muzzle to the origin of the tail; but then it must be considered, that he was caught young, and lived all his days in confinement. The head of the tiger is large and roundish; and the ears are short, and at a great distance from each other. The form of the body has a great resemblance to that of the panther. The skin is of a darkish yellow colour, striped with long black streaks; the hair is short, excepting on the sides of the head, where it is about four inches long. The point of the tail is black, and the rest of it is interspersed with black rings. His legs and claws resemble those of the lion, only the legs are much shorter in proportion to the size of the animal.

The tiger is more ferocious, cruel, and savage than the lion. Although gorged with carnage, his thirst for blood is not appeased; he seizes and tears in pieces a new prey with equal fury and rapacity, the very moment after devouring a former one; he lays waste the country he inhabits; he neither dreads the aspect nor the weapons of men; puts to death whole troops of domestic animals; and attacks young elephants, rhinoceros's, and sometimes even braves the lion himself.

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The tiger seems to have no other instinct, but a constant thirst after blood, a blind fury which knows no bounds or distinction, and which often stimulates him to devour his own young, and to tear the mother in pieces for endeavouring to defend them. He lies in wait on the banks of rivers, &c. where the heat of the climate obliges other animals to repair for drink. Here he seizes his prey, or rather multiplies his massacres; for he no sooner kills one animal, than he flies with equal fury upon the next, with no other view but to plunge in his head into their bodies and drink their blood. However, when he kills a large animal, as a horse or a buffalo, he sometimes does not tear out the entrails on the spot; but, to prevent any interruption, he drags them off to the wood, which he performs with incredible swiftness. This is a sufficient specimen of the strength of this rapacious animal.

Neither force, restraint, or violence, can tame the tiger. He is equally irritated with good as with bad treatment: he tears the hand which nourishes him with equal fury, as that which administers blows: he roars and is enraged at the sight of every living creature. Almost every natural historian agrees in this horrible character.

There is a sort of cruelty in their devastations, unknown to the generous lion; as well as a poltroonry in their sudden retreat on any disappointment. "I was informed (says Mr Pennant) by very good authority, that in the beginning of this century, some gentlemen and ladies, being on a party of pleasure, under a shade of trees, on the banks of a river in Bengal, observed a tiger preparing for its fatal spring; one of the ladies, with amazing presence of mind, laid hold of an umbrella, and furl'd it full in the animal's face, which instantly retired, and gave the company opportunity of removing from so terrible a neighbour. Another party had not the same good fortune: a tiger darted among them while they were at dinner, seized on one gentleman, and carried him off, and he never was more heard of." The tiger attacks all sorts of animals, even the lion; and it has been known that both have perished in their combats. There is in some parts of India a popular notion, that the rhinoceros and the tiger are in friendship, because they are often found near each other. But according to Mr Pennant, the fact is, that the rhinoceros, like the hog, loves to wallow in the mire; and on that account frequents the banks of rivers: the tiger, to quench its raging thirst, is met with in places contiguous to them.

Pliny has been frequently taken to task by the moderns, for calling the tiger *animal tremende velocitatis*: they allow it great agility in its bounds, but deny it swiftness in pursuit. Two travellers of authority, however, both eye-witnesses, confirm what Pliny says: the one indeed only mentions in general its vast fleetness; the other saw a trial between one and a swift horse, whose rider escaped merely by getting in time amidst a circle of armed men. The chase of this animal was a favourite diversion with the great Cam-hi, the Chinese monarch, in whose company our countryman Mr Bell*, that faithful traveller, and the Pere Gerbillon, saw these proofs of the tiger's speed.

The tiger, according to Mr Pennant, is peculiar to Asia; and is found as far north as China and Chinese Tartary, and about lake Aral and the Altaic moun-

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tains. It inhabits mount Ararat and Hyrcania, of old famous for its wild beasts; but the greatest numbers, the largest, and the most cruel, are met with in India and its islands. In Sumatra the natives are so infatuated that they seldom kill them, having a notion that they are animated by the souls of their ancestors.

The tiger has always been a more rare animal than the lion; and yet brings forth an equal number of young, namely, four or five at a litter. The female is furious at all times; but, when her young are attempted to be taken from her, her rage is redoubled: she braves every danger; she pursues the ravishers, who are obliged, when hard pressed, to drop one of the young in order to retard her motion; she stops, takes it up, and carries it into some secret part of the forest; but she instantly returns and pursues the hunters into their villages or boats.

The tiger moves the skin of his face, grinds his teeth, and roars, like the lion; but the sound of his voice is different.

III. The *Pardus*, or PANTHER.—It is about the size of a large dog, and has a great resemblance to a domestic cat. The tongue is rough, and remarkably red; the teeth are strong and sharp; the skin is exceedingly beautiful, being of a yellow colour, variegated with roundish black spots, and the hair is short. It has a cruel and ferocious aspect; his motions are brisk and lively; his cry resembles the growl of an enraged dog, but is more strong and rough.

The panther inhabits Africa, from Barbary to the remotest parts of Guinea. This species is next in size to the tiger; next to it in cruelty, and in its general enmity to the animal creation: it is to Africa what the former is to Asia, with this alleviation, that it prefers the flesh of brutes to that of mankind; but when pressed with hunger, attacks every living creature without distinction. Its manner of taking its prey is the same with that of the tiger, always by surprise, either lurking in thickets or creeping on its belly till it comes within reach: it will also climb up trees in pursuit of monkeys and lesser animals; so that nothing is secure from its attacks. He is not so perfectly ungovernable as the tiger: but, notwithstanding all attempts to render him obedient and tractable, he may rather be said to be subdued than tamed; for he never entirely loses his natural ferocity. Accordingly, when kept with a view to the hunting of bucks, goats, or other animals, great care is necessary in training him, and still greater in conducting him. When leading out to the field, they put him in a cage and carry him on a cart. When the game is sprung, they open the door of the cage; he instantly springs towards the animal, often seizes him in a few bounds, throws him to the ground, and strangles him. But, if he happens to miss his aim, he becomes mad with rage, and sometimes falls upon his master, who, in order to prevent accidents of this kind, generally carries along with him pieces of flesh, or perhaps a lamb or a kid, which he throws to him in order to appease his fury.

The ancients were well acquainted with these animals. These, and the leopards, were the *Varie* and *Pardi* of the old writers: one should think that the Romans would have exhausted the deserts of Africa by the numbers they drew from thence for their public shows. Scaurus exhibited at one time 150 panthers;

2

Pompey

* *Travels*,
vol. ii.
p. 95.

Felis.

Pompey the Great, 410; Augustus, 420. Probably they thinned the coasts of Mauritania of these animals, but they still swarm in the southern parts of Guinea.—Oppian describes two species of panthers, a large species and a small one; the first of which has a shorter tail than the lesser, and may possibly be this kind.—An animal of this species is found in Buckharia, called there *Babrs*: it is seven feet long, very destructive to horses, and even camels; the skin is fine, and valued in Russia at 1 l. Sterling.—In China there is a most remarkable kind, called there *Louchu*, whose skins sell at 6 l. Sterling a-piece. It must here also be observed, that there are in the furriers shops in London, skins in most respects resembling those of the panther; which, they assure us, come from the Spanish settlements in the West Indies: These skins equal those of the old continent in beauty and size.

Though M. Buffon denies the panther to be an inhabitant of America, yet Mr Pennant is of opinion that the same, or a variety at least, inhabits that country. 1. The figure of the species described by *Faber*, (*Hist. An. Nov. Hisp.* p. 498.) under the name of *Tigris Mexicana*, agrees exactly with that of the panther, as does also the description in general. 2. Every other animal of this genus, which has yet been discovered in America, is far inferior in size and strength to this; whose common height, *Faber* says, is four or five feet, and whose prey is wild cattle, horses, &c. *M. Condamine*, and *Le Pere Cajetan Cattaneo*, speak of the tigers (*i. e.* the panthers) of America, as equal and even superior in size to those of Africa, and the colour as bright as gold; and *Ulloa* describes them as big as little horses. 3. Notwithstanding the venders of furs are not entirely to be relied on as to the countries their goods come from, yet the general opinion of the whole trade, that these skins were the product of Spanish America, is a further proof of their being common to both continents.

Once.

IV. The *Uncia*, or *Once*, is less than the panther; the tail is longer; the hair is likewise longer, and of a whitish grey colour. The once is easily tamed; and is employed in hunting in several parts of Asia, where dogs are very scarce. He has not the delicate scent of a dog; does not trace other animals by the smell; neither can he run them down in a fair chase; but lies in wait for their approach, and then darts upon them unawares. He leaps so nimbly, that he easily clears a ditch or a wall several feet high; besides, he often climbs trees, waits till some animal passes, and instantly leaps upon them. This method of catching their prey, is practised by the panther and leopard, as well as by the once.—The once inhabits Barbary, Persia, Hyrcania, and China; from which last place the skins are brought into Russia, and sold for 20s. a-piece. It is an animal of a more gentle and mild nature than most of the preceding. It is, like the next species, used for the chase of antelopes, and even hares; but, instead of being conveyed in a waggon, is carried on the crupper on horseback. It is under as much command as a setting-dog; returns at the least call, and jumps up behind its master. This animal is supposed to be the lesser panther of Oppian, and the panthera of Pliny.

Leopard.

V. The *Leopardus* or *LEOPARD*, differs from the panther and the once, in the beauty of his colour, which is a lively yellow, with smaller spots than those

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of the two latter, and disposed in groups. He is larger than the once, and less than the panther. He inhabits Senegal and Guinea; and spares neither man nor beast. When beasts of chase fail, the leopards descend from the internal parts of Africa in crowds, and make great havock among the numerous herds that cover the rich meadows of the lower Guinea. It tears its prey to pieces with both claws and teeth; but is always thin, though perpetually devouring. The panther is its enemy, and destroys numbers of them. The negroes make collars of their teeth, and attribute to them certain virtues. The negroes take these animals in pit-falls, covered at the top with slight hurdles, on which is placed some flesh as a bait. They make a banquet of their flesh, which is said to be as white as veal, and very well tasted. Leopards skins are often brought to Europe, and reckoned very valuable. In Asia these animals are found in the mountains of Caucasus, from Persia to India; and also in China, where they are called *Poupi*. By the Bucharian traders, who often bring their skins to Russia, they are styled *Bars*. The leopard inhabits also Arabia, where it is called *Nemr*. We are informed by Mr Forskal, that in that country, as well as in Egypt, it will do no harm to man unless provoked; but will enter houses by night, and destroy the cats.

VI. The *Onca*, or American Tiger, (the *JAGUAR* of Buffon), is of a bright tawny colour; the top of the back marked with long stripes of black; the sides with rows of irregular oblong spots; open in the middle, which is of the ground-colour of the hair: the thighs and legs are marked with full spots of black, the breast and belly whitish: the tail not so long as the body. This species, which grows to the size of a wolf, and even larger, inhabits the hottest parts of South America, from the isthmus of Darien to Buenos Ayres. It is fierce, and destructive to man and beast. Like the tiger, it plunges its head into the body of its prey, and sucks out the blood before it devours it. It makes a great noise in the night, like the howling of a hungry dog; and is a very cowardly animal. It is easily put to flight, either by the shepherds dogs, or by a lighted torch, being very fearful of fire. It lies in ambush near the sides of rivers; and there is sometimes seen a singular combat between this animal and the crocodile. When the jaguar comes to drink, the crocodile, ready to surprise any animal that approaches, raises its head out of the water; upon which the former instantly strikes its claws into the eyes of this dreadful reptile, the only penetrable part, who immediately dives under the water, pulling his enemy along with it, where they commonly both perish.

Jaguar.

VII. The *Pardalis*, Mexican panther, or the *OCELOT* of Buffon, has its head, back, upper part of the rump, and tail, of a bright tawny; a black stripe extending along the top of the back, from head to tail; and from the nostrils to the corners of the eyes, there also runs a stripe of black; the sides are whitish, marked lengthways with long stripes of black, hollow and tawny in the middle, in which are sprinkled some small black spots; the legs are whitish, varied with small black spots; and the tail is also varied with small spots near its base, and larger near the end, which is black. It is above four times the size of a large cat, and

Ocelot.

B b

strongly

Felis. strongly made. It inhabits Mexico, the neighbourhood of Carthagen, and Brasil. It lives in the mountains; and is very voracious, but fearful of mankind; preying on young calves, and different sorts of game. It lurks amidst the leaves of trees; and sometimes will extend itself along the boughs as if dead, till the monkeys, tempted by their natural curiosity, approaching to examine it, become its prey.

Hunting
Leopard.

VIII. The *Jubata*, or HUNTING LEOPARD, (*Guepard Buff.*) is of the size of a large greyhound, of a long make, with a narrow chest and long legs. The colour of the body is a light tawny brown marked with numbers of small round black spots; the neck is shaggy, and the tail is longer than the body. It inhabits India; where it is tamed, and trained for the chase of antelopes. For this purpose it is carried in a small kind of waggon, chained and hoodwinked, till it approaches the herd: when first unchained, it does not immediately make its attempt, but winds along the ground, stopping and concealing itself till it gets a proper advantage, and then darts on the animals with surprising swiftness. It overtakes them by the rapidity of its bounds: but if it does not succeed in its first efforts, consisting of five or six amazing leaps, it misses its prey: losing its breath, and finding itself unequal in speed, it stands still, gives up the point for that time, and readily returns to its master. This species is called in India, *Chittab*. It is used for the taking of jackals, as well as other animals.

Black Ti-
ger.

IX. The *Discolor*, or BLACK TIGER, (*Cougaur Noir*, Buff.), is covered with short very glossy hairs of a dusky colour; the throat, belly, and inside of the legs, white. It grows to the size of a heifer of a year old, and has vast strength in its limbs. It inhabits Brasil and Guiana; and is a cruel and fierce beast, but happily is a scarce species.

Puma.

X. The *Concolor*, or PUMA (*Cougaur*, Buff.) has a very small head, ears a little pointed, and eyes large. The back, neck, rump, sides, are of pale brownish red, mixed with dusky hairs; the breast, belly, and inside of the legs, cinereous. The tail is dusky and ferruginous, the tip black; and the teeth are of a vast size. It is long bodied, and high on its legs; the length from nose to tail five feet three inches, of the tail two feet eight. This animal inhabits the continent of America, from Canada to Brasil: in South America is called *Puma*, and by Europeans mistaken for the lion. It is the scourge of the colonies of the hotter parts of America, being fierce and ravenous to the highest degree. It swims over the broad rivers; attacks the cattle in the very inclosures; and when pressed with hunger, spares not even mankind. In North America their fury seems to be subdued by the rigor of the climate; and the smallest cur, in company with its master, makes them seek for security, by running up trees: but then they are equally destructive to domestic animals, and are the greatest nuisance the planter has: when they lay in wait for the moose, or other deer, they lie close on the branch of some tree till the animal passes beneath, when they drop upon and soon destroy them. They also make wolves their prey: In the Museum of the Royal Society, there is the skin of one which was killed just as it had pulled down a wolf. When it has satisfied itself with eating, it carefully conceals the rest of the carcase, covering it with

leaves: if any other touches the relics, it never comes near them again. It sometimes purs like a cat, and at other times makes a great howling. The fur is soft, and of some value among the Indians, who cover themselves with it during winter; and who also eat the flesh, which is said to be as good and as white as veal.

Margay.

XI. The *Tigrina*, or MARGAY of Buffon, is about the size of a common cat. The upper part of the head, the neck, back, sides, shoulders, and thighs, are of a bright tawny-colour: the face is striped downwards with black: the shoulders and body are marked with stripes and oblong large black spots; the legs with small spots: the thighs are whitish, spotted with black: The tail is very long, marked with black, tawny and grey. It inhabits South America, where it lives on the feathered game and on poultry. It is untameable. It makes a noise like the common cat; lives much in trees; is very active, and goes by bounds or leaps. It brings forth in all seasons of the year, in hollow trees, and has two at a time.

XII. The *Capensis*, Cape Tiger, or TIGER-CAT of the Cape, is the *Nusfi* of Labat, who was the first who noticed this species, which he describes as "of the size of a dog, with a coat as much striped and varied as that of a tiger. Its appearance bespeaks cruelty; and its eyes fierceness; but it is cowardly, and gets its prey only by cunning and insidious arts." All these characters are perfectly applicable to the Cape cat; and it seems the animal is found in all parts of Africa, from Congo to the Cape of Good Hope, in an extent of country of about eleven degrees of latitude. Kolben also speaks of a tiger bush-cat, which he describes as the largest of all the wild cats of the Cape countries, and as spotted something like a tiger. A skin of this animal was seen by Mr Pennant in a furrier's shop in London, who thought it came from the Cape of Good Hope; from this skin Mr Pennant gave the first description which could be of any utility to a natural historian. All the other authors mention this animal in a vague manner. When Dr Forster touched the second time at the Cape of Good Hope in the year 1775, an animal of this species was offered him to purchase; but he refused buying it because it had a broken leg, which made him apprehensive of losing it by death during the passage from the Cape to London. It was very gentle and tame. It was brought in a basket to his apartment, where he kept it above 24 hours; which gave him the opportunity of describing it more accurately than had hitherto been done, and of observing its manners and economy. These he found to be perfectly analogous to those of our domestic cats. It ate fresh raw meat, and was very much attached to its feeders and benefactors: tho' it had broke the fore leg by accident, it nevertheless was very easy. After it had been several times fed by our author, it soon followed him like a tame favourite cat. It liked to be stroked and caressed; it rubbed its head and back always against the person's cloaths who fed it, and desired to be made much of. It purred as our domestic cats do when they are pleased. It had been taken when quite young in the woods, and was not above eight or nine months old; but had already very nearly, if not quite, attained its full growth. The Doctor was told, that the tiger-cats live in mountainous and woody tracts; and that

Felis.

Felis. in their wild state they are very great destroyers of hares, rabbits, yerbuas, young antelopes, lambskins, and of all the feathered tribe. A very particular technical description of this species is given in the *Phil. Transf.* vol. 71. p. 4. with a figure, which the reader will see copied among other species in our plates.

Cat. XIII. The *Catus*, or CAT.

1. The *ferus*, or wild cat, is three or four times as large as the house cat; the head larger, and the face flatter. The teeth and claws are tremendous: its muscles very strong, as being formed for rapine: the tail is of a moderate length, but very thick, marked with alternate bars of black and white, the end always black: the hips and hind part of the lower joints of the leg are black: the fur is very soft and fine. The general colour of these animals is of a yellowish white, mixed with a deep grey: these colours, though they appear at first sight confusedly blended together, yet on a close inspection will be found to be disposed like the streaks on the skin of the tiger, pointing from the back downwards, rising from a black list that runs from the head along the middle of the back to the tail.

This animal, with us, may be called the *British tiger*. It is the fiercest and most destructive beast we have; making dreadful havock among our poultry, lambs, and kids. It inhabits the most mountainous and woody parts of these islands, living mostly in trees, and feeding only by night. It multiplies as fast as our common cats; and often the females of the latter will quit their domestic mates, and return home pregnant by the former.

They are taken, either in traps or by shooting: in the latter case, it is very dangerous only to wound them; for they will attack the person who injured them, and have strength enough to be no despicable enemy. Wild cats were formerly reckoned among the beasts of chase; as appears by the charter of Richard II. to the abbot of Peterborough, giving him leave to hunt the hare, fox, and wild cat. The use of the fur was in lining of robes: but it was esteemed not of the most luxurious kind; for it was ordained, "that no abbess or nun should use more costly apparel than such as is made of lambs or cats skins." In much earlier times it was also the object of the sportsman's diversion.

This animal is the stock or origin of the domestic cat in all its varieties.—It inhabits the woods of most parts of Europe, but none are found in the vast woods of Russia or Siberia. It dwells with the common lynx in all the wooded parts of the mountains of Caucasus and their neighbourhood; and is most destructive to lambs, kids, fawns, and to all sorts of feathered game.

2. The *domesticus*, or tame cat, is so well known, that it requires no description. It is an useful, but deceitful domestic. Although when young they are playful and gay, they possess at the same time an innate malice and perverse disposition, which increases as they grow up, and which education learns them to conceal, but never to subdue. Constantly bent upon theft and rapine, though in a domestic state, they are full of cunning and dissimulation; they conceal all their designs; seize every opportunity of doing mischief, and then fly from punishment. They easily take on the habits of society, but never its manners; for they have only the appearance of friendship and attachment. This dis-

genuity of character is betrayed by the obliquity of their movements and the ambiguity of their looks. In a word, the cat is totally destitute of friendship; he thinks and acts for himself alone. He loves ease, searches for the softest and warmest places to repose himself. The cat is likewise extremely amorous; and, which is very singular, the female is more ardent than the male: she not only invites, but searches after and calls upon him to satisfy the fury of her desires; and, if the male disdains or flies from her, she pursues, bites, and in a manner compels him. This heat of passion in the females lasts but nine or ten days, and happens twice in the year, namely, in the spring and autumn; however, in some it happens thrice or four times in the year. The female goes with young 55 or 58 days, and generally produces four or five at a litter. As the male has an inclination to destroy the young, the female takes care to conceal them from him; and, when she is apprehensive of a discovery, she takes them up in her mouth one by one, and hides them in holes or inaccessible places. When she has nursed a few weeks, she brings them mice, small birds, &c. in order to learn them to eat flesh. But it is worth notice, that these careful and tender mothers sometimes become unnaturally cruel, and devour their own offspring.

The cat is incapable of restraint, and consequently of being educated to any extent. However, we are told, that the Greeks in the island of Cyprus trained this animal to catch and devour serpents, with which that island was greatly infested. This, however, was not the effect of obedience, but of a general taste for slaughter; for he delights in watching, attacking, and destroying all kinds of weak animals indifferently. He has no delicacy of scent, like the dog; he hunts only by the eye: neither does he properly pursue; he only lies in wait, and attacks animals by surprise; and after he has caught them, he sports with and torments them a long time, and at last kills them (when his belly is full), purely to gratify his sanguinary appetite.

The eye of the cat differs greatly from that of most other animals. The pupil is capable of a great degree of contraction and dilatation. It is narrow and contracted like a line during the day, round and wide in the dark. It is from this conformation of the eye that the cat sees best in the night, which gives him a great advantage in discovering and seizing his prey.

Although cats live in our houses, they can hardly be called *domestic* animals; they may rather be said to enjoy full liberty; for they never act but according to their own inclination. Besides, the greatest part of them are half wild: they do not know their masters; and frequent only the barns, out-houses, &c. unless when pressed with hunger.

Cats have a natural antipathy at water and cold. They likewise hate bad smells; but they have an affection for certain aromatic smells, and are transported with the root of the valerian.

Cats take about 18 months before they come to their full growth; but they are capable of propagation in 12 months, and retain this faculty all their life, which generally extends to nine or ten years. They eat slowly, and are peculiarly fond of fish. They drink frequently; their sleep is light; and they often assume the appearance of sleeping, when in reality they are meditating mischief. They walk softly, and without making any noise.

Felis.

noise. As their hair is always dry, it easily gives out an electrical fire, which becomes visible when rubbed across in the dark. Their eyes likewise sparkle in the dark like diamonds.—The cat, when pleased, purrs, and moves its tail: when angry, it spits, hisses, and strikes with its foot. It washes its face with its fore-foot (Linnaeus says, at the approach of a storm): it always lights on its feet: it is even proverbially tenacious of life.

• *Leges
Wallica,
p. 247, 248.*

Our ancestors seem to have had a high sense of the utility of this animal. That excellent prince *Hoel dda*, or Howel the Good, did not think it beneath him (among his laws relating to the prices, &c. of animals*), to include that of the cat; and to describe the qualities it ought to have. The price of a kitten before it could see was to be a penny; till it caught a mouse, two-pence; when it commenced mouser, four pence. It was required besides, that it should be perfect in its senses of hearing and seeing, be a good mouser, have the claws whole, and be a good nurse: but if it failed in any of these qualities, the seller was to forfeit to the buyer the third part of its value. If any one stole or killed the cat that guarded the prince's granary, he was to forfeit a milch-ewe, its fleece and lamb; or as much wheat as, when poured on a cat suspended by its tail (the head touching the floor), would form a heap high enough to cover the tip of the former. This last quotation is not only curious, as being an evidence of the simplicity of ancient manners, but it almost proves to a demonstration, that cats are not aborigines of these islands, or known to the earliest inhabitants. The large prices set on them (if we consider the high value of specie at that time†), and the great care taken of the improvement and breed of an animal that multiplies so fast, are almost certain proofs of their being little known at that period.

• *Anno 948.*

b, The Angorensis, or cat of Angora, with hair of a silvery whiteness and silky texture, and very long, especially about the neck, where it forms a fine ruff. It is a large variety; found about Angora, the same country which produces the fine-haired goat. It degenerates after the first generation in our climate. A variety of this kind is found in China with pendent ears, of which the Chinese are very fond, and ornament their necks with silver collars. They are cruel enemies to rats, and supposed to be the domestic animals which the Chinese call *fumxi*.

c, The Hispanicus, or tortoise-shell cat, has the hair varied with black, white, and orange.

d, The Cæruleus, or blue cat, a variety of a dun colour, or greyish black. It is much cultivated in Siberia on account of its fine fur; but was brought there, as well as the other domestic kinds, by the Russians.

e, The Ruber, or wild red cat of Kolben, has a streak of bright red running along the ridge of the back to the tail, and losing itself in the grey and white on the sides. The skins are said to give ease in the gout, and are much valued on that account at the Cape.

Manul.

XIV. The MANUL, with the tail longer than that of the domestic cat, beset thickly with hair, and of an equal thickness in all parts; encircled with ten black rings, the three next to the tip almost touching one another, the rest more remote. It is about the size of a fox. The limbs are very robust; in which, and in colour, this animal greatly resembles a lynx, afterwards

described. It inhabits all the middle part of northern Asia, from the Yaik, or Ural as it is now called, to the very Amur. It loves open, woodless, and rocky countries, and preys on the lesser quadrupeds.

XV. The LYNX is about 2½ feet long and 15 inches high. He has a great resemblance to the common cat; but his ears are longer, and his tail is much shorter: his hair is streaked with yellow, white, and black colours. The lynx inhabits the vast forests of the north of Europe, Asia, and America. His eyes are brilliant, his aspect is soft, and his air is gay and sprightly. Like the cat, he covers his urine with earth; he howls something like the wolf, and is heard at a considerable distance; he does not run like the dog or wolf, but walks and leaps like a cat; he pursues his prey even to the tops of trees; neither wild cats nor squirrels can escape him; he lies in wait for stags, goats, hares, &c. and darts suddenly upon them; he seizes them by the throat and sucks their blood, then opens the head and eats the brain; after this, he frequently leaves them, and goes in quest of fresh prey. The colour of his skin changes according to the season or the climate; the winter furs are more beautiful than those of summer. These furs are valuable for their softness and warmth: numbers are annually imported from North America, and the north of Europe and Asia; the farther north and east they are taken, the whiter they are, and the more distinct the spots. Of these the most elegant kind is called *irbyr*, whose skin sells on the spot for one pound Sterling. The ancients* celebrated the great quickness of the lynx's sight; and feigned that its urine was converted into a precious stone.

Felis.

Lynx.

• *Phn.
viii. 8.
xxviii. 8.*

XVI. The SERVAl, has the upper part of the body of a dusky colour, interspersed with round black spots; the belly, and the orbits of the eye, are white. This animal, which is very fierce and untameable, inhabits the woods in the mountainous parts of India; where it lives in trees, and breeds in them. It scarcely ever descends on the ground; but leaps with great agility from tree to tree. It is called by the natives of Malabar the *maraputé*, by the Portuguese the *serval*.

Serval.

XVII. The CHAUS, or Caspian Lynx, has a round head, a little more oblong than that of the common cat; shining restless eye, with a most brilliant golden pupil; ears erect, oval, and lined with white hairs, their outside reddish, their summits tufted with black. The hairs are coarser than those of the cat or common lynx, but less so than those of the wolf. They are shortest on the head, but on the top of the back are above two inches long. The colour of the head and body is a yellowish brown: the breast and belly of a bright brown nearly orange. The tail reaches only to the flexure of the leg; is thick and cylindric; of the same colour with the back, tipped with black, and thrice obscurely annulated with black near the end. In general appearance it has the form of the domestic cat. Its length is 2½ feet from the nose to the base of the tail: its tail little more than 11 inches: its height before is 19 inches; behind, 20. It is sometimes found larger, there being instances of its reaching the length of 3 feet from the nose to the tail. This animal, which has been but lately discovered, inhabits the reeds and woods in the marshy parts that border on the western sides of the Caspian Sea, particularly about the castle Kiflar on the river

Chaus.

Felis.

Terek, and in the Persian provinces of Ghilan and Masanderan, and frequent about the mouth of the Kur, the ancient Cyrus.—In manners, voice, and food, it agrees with the wild cat. It conceals itself in the day, and wanders over the flooded tracks in search of prey; feeding on rats, mice, and birds, but seldom climbing trees. It is excessively fierce, and never frequents the haunts of mankind. It is so impatient of captivity, that one which was taken in a trap, and had a leg broken, refused for many days the food placed by it; but in its fury devoured the fractured limb, with pieces of the stake it was fastened to, and broke all its teeth in the phrensy of its rage.

Sivah Ghush.

XVIII. The *Caracal*, *SIVAH GHUSH*, or Persian Lynx, with a lengthened face and small head; very long, slender ears, terminated with a long tuft of black hairs; eyes small: the upper part of the body is of a very pale reddish brown; and the belly and breast are whitish: the limbs are strong and pretty long; and the tail is about half the length of the body. These animals inhabit Persia, India, and Barbary; where they are often brought up tame, and used in the chase of lesser quadrupeds, and the larger sort of birds, such as cranes, pelicans, peacocks, &c. which they surprise with great address. When they seize their prey, they hold it fast with their mouth, and lie for a time motionless on it. They are said to attend the lion, and to feed on the remains of the prey which that animal leaves. They are fierce when provoked: Dr Charleton says, he saw one fall on a hound, which it killed and tore to pieces in a moment, notwithstanding the dog defended itself to the utmost.—The Arabian writers call it *anak el ard*; and say, that it hunts like the panther, jumps up at cranes as they fly, and covers its steps when hunting.

Libyan Lynx.

The *LIBYAN LYNX* is a variety, with short black tufts to the ears, which are white within, and of a lively red without; the tail white at the tip, annulated with four black rings, with black marks behind the four legs. It is greatly inferior in size to the former; not larger than a common cat. It inhabits both Libya and Barbary.

Bay Lynx.

XIX. The *Rufa*, or *BAY LYNX*, with a short tail, yellow irides, and upright sharp-pointed ears; tufted with long black hairs: the colour of the head, back, sides, and exterior parts of the legs, bright bay, obscurely marked with dusky spots: from beneath each eye certain long black stripes, of an incurvated form, mark the cheeks; which, with the upper and under lip, whole under side of the body, and insides of the legs, are white: the upper part of the tail is barred with dusky strokes; and next the end, one of a deep black; its tip and under side are white. This animal, which is about twice the bigness of a large cat, inhabits the inner parts of the province of New York.

Canadian Lynx.

XX. The *CANADIAN LYNX*, with pale yellow eyes, and erect ears tufted with black long hair. The body is covered with soft and long fur, cinereous tinged with tawny, and marked with dusky spots, more or less visible in different subjects, dependent on the age or season in which the animal is killed: the legs are strong and thick; the claws large. It is about three times the size of a common cat: the tail is only four inches long, tipped with black. This species inhabits the vast forests of North America. It is called in Canada *le chat-cervier*,

or *le loup-cervier*, on account of its being so destructive to deer; which it drops on from the trees, like the *puma*, and, fixing on the jugular vein, never quits its hold till the exhausted animal falls through loss of blood. The English call it a *wild cat*. It is very destructive to their young pigs, poultry, and all kind of game. The skins are in high esteem for the softness and warmth of the fur; and great numbers are annually imported into Europe.

Felis
||
Felo.Cat-a-
mountain.

XXI. The *Mountain Lynx*, or *CAT-A-MOUNTAIN*, upright pointed ears, marked with two brown bars; with the head and upper part of the body of a reddish brown, with long narrow stripes of black; the sides and legs with small round spots: the chin and throat are of a clear white; the belly of a dull white. The length of the animal, from nose to tail, is two feet and a half; of the tail, eight inches. It inhabits North America; and is said to be a gentle animal, and to grow very fat.

FELL (Dr John), a very learned English divine and bishop, entered a student at Christ-church, Oxford, 1636. In 1648, he was ejected by the parliamentary visitors, being then in holy orders: and from that time to the restoration lived at Oxford a retired and studious life. He was installed canon of Christ-church, July 1660; and the year following, dean of that church; in which places he did great services to the college, and reformed several abuses. He was consecrated bishop of Oxford in 1675; and had leave to hold his deanry in *commendam*, that he might continue his services to the college and university. He published several works, and died in 1686.

FELLING of TIMBER.—Many circumstances are well known and constantly observed in the felling of timber for building, which, though to a hasty observer they might appear trifling, yet prove, on experience, to be of the utmost consequence. One thing observed by M. de Buffon, which very greatly increases the solidity and strength of timber, is, that the trees intended to be felled for service should first be stripped of their bark, and suffered to stand and die upon the spot before the cutting. The sappy part or blea of the oak, becomes by this means as hard and firm as the heart; and the real strength and density of the wood has been proved, by many experiments, to be greatly increased by it: nor is this a practice of any detriment to the proprietor, since the remaining stumps of these trees send up their young shoots as vigorously as if they had been cut down in their natural condition.

When any tree is to be cut down for timber, the first thing to be taken care of is a skilful disbranching of such limbs as may endanger in its fall: many trees are utterly spoiled for want of a previous care of this kind. In arms of timber that are very great, it is always necessary to chope or sink in them close to the bole, and then meeting it with down-right strokes, it will be severed from the tree without splitting. In felling the tree, take care always to cut it as close to the ground as possible, unless it is intended to be grubbed up: and the doing that is of advantage both to the timber and to the wood; for timber is never so much valued, if it be known to grow out of old stocks.

FELLOWSHIP, COMPANY, or *Distributive-Portion*, in arithmetic. See ARITHMETIC, n° 15

FELO DE SE, in law, a person that lays deliberate

Felony,
Felony.

ly violent hands on himself, and is the occasion of his untimely death, whether by hanging, drowning, stabbing, shooting, or any other way.

FELON, in law, a person guilty of felony. See FELONY.

Blackst.
Comment.

FELONY, in the general acceptation of the law, comprises every species of crime, which occasions at common law the forfeiture of lands or goods. This most frequently happens in those crimes for which a capital punishment either is or was to be inflicted: for those felonies that are called *clergyable*, or to which the benefit of clergy extends, were anciently punished with death in all lay, or unlearned, offenders; though now, by the statute-law, that punishment is for the first offence universally remitted. Treason itself, says Sir Edward Coke, was anciently comprised under the name of *felony*: and in confirmation of this we may observe, that the statute of treasons, 25 Edw. III. c. 2. speaking of some dubious crimes, directs a reference to parliament; that it may be there adjudged, "whether they be treason or other felony." All treasons, therefore, strictly speaking, are felonies; though all felonies are not treason. And to this also we may add, that all offences, now capital, are in some degree or other felony: but this is likewise the case with some other offences, which are not punished with death; as suicide, where the party is already dead; homicide by chance-medley, or in self-defence; and petit-larceny, or pilfering; all which are (strictly speaking), felonies, as they subject the committers of them to forfeitures. So that, upon the whole, the only adequate definition of felony seems to be that which is before laid down; viz. an offence which occasions a total forfeiture of either lands or goods, or both, at the common law; and to which capital or other punishment may be superadded, according to the degree of guilt.

To explain this matter a little farther: The word *felony*, or *felonia*, is of undoubted feudal original, being frequently to be met with in the books of feuds, &c. but the derivation of it has much puzzled the juridical lexicographers, Prætorius, Calvinus, and the rest: some deriving it from the Greek, *πῆλος*, "an impostor or deceiver;" others from the Latin, *falso fesselli*, to countenance which they would have it called *fellonia*. Sir Edward Coke, as his manner is, has given us a still stranger etymology; that it is *crimen animo felleo perpetratum*, "with a bitter or gallish inclination." But all of them agree in the description, that it is such a crime as works a forfeiture of all the offender's lands or goods. And this gives great probability to Sir Henry Spelman's Teutonic or German derivation of it: in which language indeed, as the word is clearly of feudal original, we ought rather to look for its signification, than among the Greeks and Romans. *Fel-on* then, according to him, is derived from two northern words: *FEE*, which signifies (we well know) the fief, feud, or beneficiary estate; and *LON*, which signifies price or value. Felony is therefore the same as *pretium feudi*, the consideration for which a man gives up his fief; as we say in common speech, such an act is as much as your life, or estate is worth. In this sense it will clearly signify the feudal forfeiture, or act by which an estate is forfeited, or escheats, to the lord.

To confirm this, we may observe, that it is in this sense, of forfeiture to the lord, that the feudal writers

constantly use it. For all those acts, whether of a criminal nature or not, which at this day are generally forfeitures of copyhold estates, are styled *feloniae* in the feudal law: "*scilicet, per quas feudum amittitur.*" As "*si domino deservire noluerit;—si per annum et diem cessaverit in petenda investitura;—si dominum ejuravit, i. e. negavit se a domino feudum habere;—si a domino in jus eum vocante, ter citatus non comparuerit;*"—all these, with many others, are still causes of forfeiture in our copyhold estates, and were denominated *felonies* by the feudal constitutions. So likewise injuries of a more substantial or criminal nature were denominated *felonies*, that is, forfeitures: as assaulting or beating the lord; vitiating his wife or daughter, "*si dominum cucurbitaverit, i. e. cum uxore ejus concubuerit;*" all these are esteemed felonies, and the latter is expressly so denominated, "*si fecerit feloniam, dominum forte cucurbitando.*" And as these contempts, or smaller offences, were felonies or acts of forfeiture, of course greater crimes, as murder and robbery, fell under the same denomination. On the other hand, the lord might be guilty of felony, or forfeit his seignory to the vassal, by the same act as the vassal would have forfeited his feud to the lord. "*Si dominus commisit feloniam, per quam vassallus amitteret feudum si eam commiserit in dominum, feudi proprietatem etiam dominus perdere debet.*" One instance given of this sort of felony in the lord is beating the servant of his vassal, so as that he loses his service; which seems merely in the nature of a civil injury, so far as it respects the vassal. And all these felonies were to be determined, "*per laudamentum sive judicium parium suorum;*" in the lord's court; as with us forfeitures of copyhold lands are presentable by the homage in the court-baron.

Felony, and the act of forfeiture to the lord, being thus synonymous terms in the feudal law, we may easily trace the reason why, upon the introduction of that law into England, those crimes which induced such forfeiture or escheat of lands (and, by a small deflexion from the original sense, such as induced the forfeiture of goods also) were denominated *felonies*. Thus it was that suicide, robbery, and rape, were felonies; that is, the consequence of such crimes was forfeiture; till by long use we began to signify by the term of *felony* the actual crime committed, and not the penal consequence. And upon this system only can we account for the cause, why treason in ancient times was held to be a species of felony; viz. because it induced a forfeiture.

Hence it follows, that capital punishment does by no means enter into the true idea and definition of *felony*. Felony may be without inflicting capital punishment, as in the cases instanced of self-murder, excusable homicide, and petit larceny: and it is possible that capital punishments may be inflicted, and yet the offence be no felony; as in case of heresy by the common law, which, though capital, never worked any forfeiture of lands or goods, an inseparable incident to felony. And of the same nature was the punishment of standing mute, without pleading to an indictment; which at the common law was capital, but without any forfeiture, therefore such standing mute was no felony. In short, the true criterion of felony is forfeiture: for, as Sir Edward Coke justly observes, in all felonies which are punishable with death, the offender loses all

Felony.

Felt.
Felt-spar.

his lands in fee-simple, and also his goods and chattels; in such as are not punishable, his goods and chattels only.

The idea of felony is indeed so generally connected with that of capital punishment, that we find it hard to separate them; and to this usage the interpretations of the law do now conform. And therefore, if a statute makes any new offence felony, the law implies that it shall be punished with death, viz. by hanging, as well as with forfeiture: unless the offender prays the benefit of clergy; which all felons are intitled once to have, unless the same is expressly taken away by statute.

Felonies by statute are very numerous; and as this work will not admit of a proper enumeration, we must refer to the Table of the quarto edition of the Statutes, where they are set forth in alphabetical order.

FELT, in commerce, a sort of stuff deriving all its consistence merely from being fulled, or wrought with lees and size, without either spinning or weaving.

Felt is made either of wool alone, or of wool and hair. Those of French make, $3\frac{1}{2}$ yards long, and $1\frac{1}{2}$ broad, for cloaks, pay each 2 l. 14 s. $1\frac{8}{9}$ d. on importation; and draw-back 1 l. 12 s. 3 d. on exporting them again.

Felt-Spar, or *Rhombic Quartz*, the *petunise* of the Chinese, a genus of siliceous earths, according to Cronstedt, resembling the jasper in most respects. Its German name is *feld-spat*, from the word *feld*, which signifies a field, and likewise a compartment or regular surface. Hence, according to Mr Forster, the word *feld-spat* signifies a spar composed of little compartments of rhombic or other figures. It strikes fire with steel, and melts in a violent heat. M. Bayen, who analysed it by acids, obtained a considerable quantity of argillaceous and siliceous earths, a smaller quantity of magnesia, and a still smaller of calcareous earth and iron. It is found either sparry or crystallized. The former species has several varieties. 1. White. 2. Reddish brown, occurring in the Swedish and other granites. 3. Pale yellow. 4. Greenish, resembling the schorl or cockle spar, but less fusible, and more irregular in the figure. The crystallized kind is found in an iron mine in Westmanland in Sweden, seldom in the form of veins, and still more rarely constituting the substance of whole mountains, but generally mixed either with quartz or mica; in which case it is called *granite*. When mixed with jasper, along with some particles of quartz, cockle, and horn-blende, it is named *porphyry*.

Another kind of this stone, named by M. Bayen *white felt-spar*, is found in the duchy of Lorraine. It is of an opaque white colour, spotted on the outside with ochre. It consists of shining particles, which give it a sparry appearance: it is very hard, and strikes fire with steel, is affected by acids; and when analysed by them, appears to contain one half its weight of siliceous earth, the other being composed of magnesia and iron.

Analogous to the felt-spar is that beautiful stone named *Labrador-stone*, lately brought to Europe. It was discovered some years ago by the Moravians, who have a colony among the Esquimaux, in the country

of Labrador in North America. It is found of a light or deep-grey colour, but for the most part of a blackish grey. When held in the light in various positions, it discovers a variety of colours, such as the blue of lapis lazuli, grass-green, apple-green, pea-green, and sometimes, but more seldom, a citron-yellow. Sometimes it has a colour between that of red copper and tom-buck-grey; at other times the colours are between grey and violet. For the most part these colours are in spots, but sometimes in stripes on the same piece. The stones are found in pretty large angular pieces, appear foliated when broken, and the fragments of a rhomboidal figure. Their specific gravity is about 2.755, and in other respects they agree with the felt-spar. Werner informs us, that he has seen a piece of felt-spar at Gayer, which showed a great variety of colours, but very pale.

Mr Kirwan observes on the felt-spar, in general, that it is found of many different colours, as white, yellow, red, brown, green, violet, &c. sometimes crystallized in rhombs, cubes, or parallelopipeds; at other times without any regular figure. It breaks like spar, but the texture is close though lamellar. The specific gravity, according to our author, is from 2.400 to 2.600, but Mr Gerchard says he found it as high as 3.500; in which case Mr Kirwan is of opinion that it was mixed with some metallic particles. It is harder than the fluor spars, but less so than quartz. It also melts without addition more perfectly and easily than the fluors, forming a whitish glass, which does not corrode the crucibles as that from fluor does. It is entirely dissolved without effervescence by the microcosmic salt and by borax; but unites with difficulty to fixed alkalies. In its crystallized state it decrepitates in the fire, but not otherwise. It is found in loose masses, about two inches long at most, without forming either veins or strata. It is also found mixed with sand or clay; or it is sometimes found imbedded in other stones, as granite, &c. One hundred parts of the white spar contain 67 of siliceous, 14 of argillaceous, 11 of ponderous earth, and 8 of magnesia. According to Mr Kirwan, it is undoubtedly the stone used by the Saxons, as *petunsa*, in their porcelain manufactures.

Cronstedt, who supposes this stone to be of the same nature with jasper, remarks, that "if the rhombic quartz and jasper were of the same species, that sort of porphyry which is made up of these two bodies ought only to be ranked with the *jaspers*, instead of being placed with the *saxa*. It is observable, however, in old monuments, which have been long exposed to the air, that though porphyry had decayed in such a manner as to lose its polish, yet granite, though equally old, and composed for the most part of rhombic quartz, has preserved its lustre. This, however, does not contradict the possibility of rhombic quartz being the same substance with the jasper: the calcareous spar, for instance, being found to bear the weather, and even fire, better than limestone."

FELTRIA, (anc. geog.), a town on the borders of Rætia towards Italy. Now *Feltri*, in the territory of Venice, on the Piava. E. Long. 12. 16. N. Lat. 46°.

FELUCCA, in sea-affairs, a little vessel armed with
fig.

Felt-spar
||
Felucca.

Female
||
Fen.

fix oars, frequent in the Mediterranean; which has this peculiarity, that its helm may be applied either in the head or stern, as occasion requires.

FEMALE, (*FEMINA*), a term peculiar to animals, signifying that sex which conceives and generates its young within itself. See **SEX** and **GENERATION**.

FEMALE is also applied, figuratively, to things without life, from the resemblance they bear to the females of animals. Thus we say a

FEMALE-Screw. See **SCREW**.

FEMALE-Flower. See *Femineus Flos*.

FEMALE-Plant. See *Feminea PLANTA*.

FEMME COVERT, in law, a married woman. See **COVERTURE**.

FEMME Sole, an unmarried woman, whose debts, contracted before marriage, become those of her husband after it.

A *femme-sole* merchant, is where a woman, in London, uses a trade alone, without her husband; on which account she shall be charged without him.

FEMININE, in grammar, one of the genders of nouns. See **GENDER**.

The feminine gender is that which denotes the noun or name to belong to a female. In the Latin, the feminine gender is formed of the masculine, by altering its termination; particularly by changing *us* into *a*. Thus, of the masculine *bonus equus*, "a good horse," is formed the feminine *bona equa*, "a good mare;" so, of *parvus homo*, "a little man," is formed *parva femina*, "a little woman," &c.

In French, the feminine gender is expressed, not by a different termination, but by a different article: thus, *le* is joined to a male, and *la* to a female.

In English, we are generally more strict, and express the difference of sex, not by different terminations, nor by different particles, but different words; as boar and sow, boy and girl, brother and sister, &c.—though sometimes the feminine is formed by varying the termination of the male into *ess*; as in abbot, abbess, &c.

FEMUR, OS **FEMORIS**, in anatomy. See there, n° 58.

FEN, a place overflowed with water, or abounding with bogs. See **BOG** and **DRAINING**.

Fens are either made up of a congeries of bogs; or consist of a multitude of pools or lakes, with dry spots of land intermixed, like so many little islands.

Several statutes have been made for the draining of fens, chiefly in Kent, Cambridgeshire, Bedfordshire, and Lincolnshire; and by a late act, 11 Geo. II. commissioners shall be appointed for the effectually draining and preserving of the fens in the isle of Ely, who are authorized to make drains, dams, and proper works thereon; and they may charge the landholders therein with a yearly acre-tax, and, in default of payment, sell the defender's lands.

The wet grounds called *fens*, in Lincolnshire and elsewhere in England, bring many advantages to the inhabitants of those counties. Fowl and fish are very plentiful in them. The pike and eels are large and easily caught, but they are usually coarse. The duck, mallard, and teal, are in such plenty as is scarce to be conceived. They are taken by decoys in prodigious flocks at a time. They send these fowl from Lincoln-

N° 125.

shire to London, twice a-week, on horseback, from Michaelmas to Lady-day; and one decoy will furnish 20 dozen, or more, twice a-week, for the whole season in this manner. The decoy-men contract with the people, who bring them to London at a certain rate, and they are obliged to take off their hands the whole number that is caught. Two teal are usually reckoned equal to one duck; and six ducks and 12 teal are accounted a dozen of wild-fowl; and the usual market price is about 9s. for such a dozen. About midsummer, during the moulting-season, a great number also are destroyed by the people in the neighbourhoods. The poor birds at this season are neither able to swim nor fly well; and the people going in with boats among the reeds where they lie, knock them down with long poles. A little before Michaelmas, vast flocks of these birds arrive at the decoys from other places; they soon grow fat in them, and continue there a prey to the masters or owners, as long as the decoys are unfrozen; but, when they are iced over, they fly away again, and go to the neighbouring fens for food.

The fens also abound in a sort of herbage that is very nourishing to cattle. Sheep and horses always grow fat upon it. These fens are common, and the owners of cattle mark them that they may be known. It is remarkable, that, though all is open, the cattle used to one particular spot of ground seldom leave it, but the owner may always find them in or near the same place. The fens have many large and deep drains. In these the pike and eel grow to a vast size: and they are full of geese which feed on the grass; but these eat rank and muddy, and may even be smelt as soon as a person comes into the room where they are roasting. But the people have another very great advantage from these birds besides the eating of them, namely, their feathers and quills; and the produce of these is so great, that the custom-house books in the town of Boston shew, that there are frequently sent away in one year 300 bags of feathers, each containing a hundred and a half weight. Each pound of feathers brings in the owner twopence; and it may be thought strange by people unacquainted with these things, but it is a certain truth, that the owners pull them five or six times a year for the feathers, and three times for the quills. Each pulling comes to about a pound, and many people have 1000 geese at a time, or more. They are kept at no charge, except in deep snowy weather, when they are obliged to feed them with corn.

Oats also grow very well in many of the fen countries, and in good seasons bring great increase and advantage to the owners. There is also another vegetable of great profit to them. This is the *rapum silvestre*; the seed of which they call *cole seed*; and they make an oil from it of great use in trade. They grind the seed between two large stones, the one standing perpendicularly on the other. The stones are made of a sort of black marble, and are brought from Germany. They sometimes turn them by sails, and sometimes by the drains which carry off the water from the fen lands.

The fens lying low, and being of a vast extent, are very subject to be overflowed by waters from the neighbouring high countries; and though great care and expence

Fen.

Fence. expence is used to keep them dry, they are often like a sea; and the sheep are obliged to be carried off in boats, and the people to live in their upper rooms, and to be supplied with provisions also with boats.

FENCE, in gardening and husbandry, a hedge, wall, ditch, bank, or other inclosure, made round gardens, fields, woods, &c.

In hot climates, where they have not occasion for walls to ripen their fruit, their gardens lie open, where they can have a water-fence, and prospects; or else they bound their gardens with groves, in which are fountains, walks, &c. which are much more pleasing to the sight than a dead wall: but, in colder countries, we are obliged to have walls to shelter and ripen our fruit, although they take away much from the pleasant prospect of the garden. Brick-walls are accounted the best and warmest for fruit: and these walls, being built pannelwise, with pillars at equal distances, will save a great deal of charge, in that the walls may be built thinner than if they were made plain without these pannels, for then it would be necessary to build them thicker every where; and, besides, these pannels make the walls look the handsomer. Stone-walls, however, on account of their durability, are to be preferred to those of brick, especially those of square hewn stones. Those that are made of rough stones, though they are very dry and warm, yet, by reason of their unevenness, are inconvenient to nail up trees to, except pieces of timber be laid in them here and there for that purpose.

But, in large gardens, it is better to have the prospect open to the pleasure-garden; which should be surrounded with a fosse, that from the garden the adjacent country may be viewed. But this must depend on the situation of the place: for, if the prospect from the garden is not good, it had better be shut out from the sight than be open. As also, when a garden lies near a populous town, and the adjoining grounds are open to the inhabitants; if the garden is open, there will be no walking there in good weather, without being exposed to the view of all passers, which is very disagreeable.

Where the fosses are made round a garden which is situated in a park, they are extremely proper; because hereby the prospect of the park will be obtained in the garden, which renders those gardens much more agreeable than those that are confined.—In the making these fosses there have been many inventions; but, upon the whole, none seem preferable to those which have an upright wall next the garden, which (where the soil will admit of a deep trench) should be five or six feet high; and, from the foot of this wall, the ground on the outside should rise with a gradual easy slope, to the distance of 18 or 20 feet; and where it can be allowed, if it slopes much farther it will be easier, and less perceptible as a ditch, to the eye, when viewed at a distance: but, if the ground is naturally wet, so as not to admit a deep fosse, then, in order to make a fence against cattle, if the wall be four feet high, and slight posts of three feet high are placed just behind the wall, with a small chain carried on from

post to post, no cattle or deer will ever attempt to jump against it; therefore it will be a secure fence against them; and if these are painted green, they will not be discerned at a distance, and at the same time the chain will secure persons walking in the garden from tumbling over.

In places where there are no good prospects to be obtained from a garden, it is common to make the inclosure of park-paling; which, if well performed, will last many years, and has a much better appearance than a wall: and this pale may be hid from the sight within, by plantations of shrubs and evergreens; or there may be a quick-hedge planted within the pale, which may be trained up, so as to be an excellent fence by the time the pales begin to decay.

Fences round parks are generally of paling; which if well made of winter-fallen oak, will last many years. But a principal thing to be observed, in making these pales, is not to make them too heavy; for, when they are so, their own weight will cause them to decay: therefore the pales should be cleft thin; and the rails should be cut triangular, to prevent the wet lodging upon them; and the posts should be good, and not placed too far asunder. If these things are observed, one of these pales will last, with a little care, upwards of 40 years very well. The common way of making these fences is, to have every other pale nine or ten inches above the intermediate ones; so that the fence may be six feet and a half high, which is enough for fallow deer; but, where there are red deer, the fence should be one foot higher, otherwise they will leap over.

Some inclose their parks with brick walls; and in countries where stone is cheap, the walls are built with this material; some with, and others without, mortar.

A kitchen-garden, if rightly contrived, will contain walling enough to afford a supply of such fruits as require the assistance of walls, for any family; and this garden, being situated on one side, and quite out of sight of the house, may be surrounded with walls which will screen the kitchen-garden from the sight of persons in the pleasure-garden; and, being locked up, the fruit will be much better preserved than it can be in the public garden; and the having too great a quantity of walling is often the occasion that so many ill-managed trees are frequently to be seen in large gardens.

The height of garden walls should be 12 feet, which is a moderate proportion; and, if the soil be good, it may in time be well furnished with bearing-wood in every part, especially that part planted with pears, notwithstanding of the branches being trained horizontally from the bottom of the walls.

With regard to the more common kinds of fences, Mr Anderson gives the following directions, in his *Essays on Agriculture*, &c. "The fences that are most universally employed, are either stone-dikes or hedges (A). Dikes, if well built, as effectually preserve a field from the intrusion of domestic animals, as any other kind of fence whatever; but they afford little

C c warmth

(A) *Dike* is a term employed to denote any kind of wall reared for the purpose of inclosing a field and nothing else.

Fence.

warmth or shelter to the field: whereas hedges, if good, answer both these purposes equally well. But the most material distinction between dikes and hedges is, that dikes are in their highest degree of perfection as soon as they are reared, and from that moment begin to tend towards decay; so that the person who builds this kind of fence immediately receives the full benefit thereof: whereas hedges, being at first weak and tender, stand in need of attention and care, and do not become a fence for several years after they are planted; and, as they continue to increase in strength, and gradually acquire a higher and higher degree of perfection, it is long before they begin to fall towards decay; so that they are, in general, infinitely more durable than dikes, although they are longer of becoming of use to the person who plants them. Which of these two kinds of fences may, upon the whole, be most eligible, must, in general, be determined by the circumstances and views of the possessor of the ground to be inclosed. If he is a tenant who has a short lease, without a prospect of getting it renewed; or, if he has immediate occasion for a complete fence; it will be, in general, most prudent in him to make choice of dikes, if the materials for rearing these are at hand: but, if there is any probability that his posterity may reap any advantage from these inclosures, it will be almost always more for his advantage to make choice of hedges.

"A dike built of freestone and lime will be almost as durable as a hedge; although, in general, it will neither be so cheap nor agreeable. But dry-stone dikes, unless built of the finest quarried stone, are of such a perishable nature, as to be hardly ever worth the expence of rearing; and never, excepting where the field that you would wish to inclose has plenty of stones upon its surface, which you are under a necessity of carrying away before the field can be improved. In this situation a man may, in some measure, be excused, if he should be tempted to put them into dikes; because the carriage of these stones may be said to cost him nothing: and he may, perhaps, be at some loss how to dispose of them in any other manner. But, in all other circumstances, it is very bad economy to rear fences of this kind, as seal dikes can always be built at one-fourth of the expence that these would cost—will answer all purposes equally well; and, if carefully built, will be kept in repair for any number of years at as small an expence as they could be.

"The want of durability generally complained of in these dikes is owing to their bad construction. The greatest part of them are made of a considerable thickness, with a ditch on each side; the heart of the dike being made up with the earth that is taken from these ditches; and only a thin wall, on each side, is built of solid seal from top to bottom; the consequence of which is, that as the loose earth that is thrown into the middle of the dike subsides much more than the seal on each side, the top of the dike sinks down; and, of course, the two side-walls are pressed too much upon the inside, so as to bilge (swell) out about the middle, and quickly crumble down to dust. To avoid this inconvenience, I have always chosen to build my dikes of this sort thinner than usual: they being only three feet and a half thick at the bottom; one foot, or a very little more, at top; and five feet high: taking care to have them built in such a manner, as that every

fod (seal), from top to bottom binds the joinings of the others below it, with as much accuracy as the bricks in a well-built wall. The uppermost course of seal is cut a little longer than those that are immediately below it, and placed with the grassy side uppermost, so as to project a little on each side; which not only helps to throw the water a little off the dike, but also to prevent sheep or cattle from attempting to jump over it so readily as they otherwise might do. At the foot of the dike, on each side, is dug a small ditch, about a foot and a half or two feet deep; leaving a ledge of a few inches broad on each side, that the dike may not be undermined by the crumbling down of the loose earth into the ditch. These ditches not only help to give the dike an additional height, and keep its foundation dry; but are also of use to prevent cattle from coming close to it and rubbing upon it, or tearing it down with their horns, which they are very apt to do if this precaution be omitted. The earth that is taken out of the ditches may be thrown outwards into the place that was occupied by the seal that has been taken to build the dike; and if the field is in grass, a few seeds may be sowed upon it, and it will soon be covered as well as the rest of the field.

"By having the joints bound in every direction, the fabric is rendered much firmer than it could be by any irregular manner of working, while it is at the same time more easily reared. If the ground is soft, and the seal rise well, I get a fence of this kind done for one penny halfpenny *per* yard; but, if it is not good to work, a little more than that must be allowed. As to the time that a fence of this kind may stand without needing any repair, I cannot speak with certainty, as it is not long since I fell into this method of building them. The oldest has just now stood ten years, and seems to be nearly as firm as when first built. I have seen some walls of poor cottages which have been built somewhat after this manner, that have been good after standing 40 or 50 years: but their durability depends greatly upon the nature of the seal of which they are formed. The best is that which is taken from poor ground of a spongy quality, which is generally covered with a strong sward of coarse bent grass. And, in situations where this can be had, I would have no hesitation in recommending this as the cheapest and best temporary fence that could be reared.

"The greatest inconvenience that attends this species of fence, is the danger it runs of being torn down by the horns, or wasted away by the rubbing, of cattle upon it; which they will sometimes do notwithstanding of the ditches. This may be effectually prevented by planting a row of sweet-briar (*eglantine*) plants between the first and second course of seal when the dike is built, which will not fail to grow with luxuriance, and in a short time defend the dike from every attack of this kind. But if sheep are to be kept in the inclosures, this plant ought not, on any account, to be employed; for, as that animal naturally flies to the fences for shelter in stormy weather, the prickles of the straggling branches of the briar will catch hold of the wool, and tear it off in great quantities, to the great detriment of the flock and loss of the proprietor. In these cases, if the possessor of the ground is not afraid of the bad consequences that may be dreaded from the spread.

Fence.

Fence. spreading of whins (*furze*), it would be much better to scatter a few of the seeds of this plant along the ledge at the foot of the dike, which would quickly become a preservative for it, and be otherwise of use as a green food for his sheep during the winter season. But, before he ventures to sow this plant, let him remember, that where it is once established, it will hardly fail to spread through the adjoining fields, and can hardly be ever afterwards thoroughly rooted out.

"I have often imagined that this kind of fence might be greatly improved both in beauty and strength, by planting a row of ivy plants beneath the first course of seal in building the dike; which would, in a short time, climb up the sides of the dike and cover the whole with a close and beautiful network of woody fibres; covered with leaves of the most beautiful verdure; which would tend to preserve the dike from being eat away by frost, and other vicissitudes of weather. And when it is arrived at the top, it would there send out a number of strong woody branches, forming a sort of hedge, that would afford some shelter to the fields, and break the force of the wind considerably; but as I never have yet had an opportunity of trying the experiment, I only here offer it as a probable conjecture. I have seen a garden-wall that had been built of stone and clay, ornamented and strengthened in this way. I have had the experience of ivy growing well upon a dry stone-dick: and have likewise seen it growing up the walls, and covering whole cottages built of seal; which have by this means been preserved entire, long after the walls that had been naked have fallen to decay. But, not having had plants of this kind at hand, I have not had an opportunity of trying it in the manner proposed; although, I think, there is the greatest reason to hope for success.

"Whins (*furze*) have been often employed as a fence when sowed upon the top of a bank. They are attended with the convenience of coming very quickly to their perfection, and of growing upon a soil on which few other plants could be made to thrive: but, in the way that they are commonly employed, they are neither a strong nor a lasting fence. The first of these defects may, in some measure, be removed, by making the bank upon which they are sowed (for they never should be transplanted) of a considerable breadth; in order that the largeness of the aggregate body, considered as one mass, may in some measure make up for the want of strength in each individual plant. With this view, a bank may be raised of five or six feet in breadth at the top, with a large ditch on each side of it; raising the bank as high as the earth taken from the ditches will permit; the surface of which should be sowed pretty thick with whin-seeds. These will come up very quickly; and in two or three years will form a barrier that few animals will attempt to break thro', and will continue in that state of perfection for some years. But the greatest objection to this plant as a fence is, that, as it advances in size, the old prickles always die away; there being never more of these alive at any time upon the plant, than those that have been the produce of the year immediately preceding: and these thus gradually falling away, leave the stems naked below as they advance in height; so that it very soon becomes an exceeding poor and unsightly fence; the stems being entirely bare, and so slender withal as

not to be able to make a sufficient resistance to almost any animal whatever. To remedy this great defect, either of the two following methods may be adopted. The first is, to take care to keep the bank always stored with young plants; never allowing them to grow to such a height as to become bare below: and it was principally to admit of this, without losing at any time the use of the fence, that I have advised the bank to be made of such an unusual breadth. For if one side of the hedge be cut quite close to the bank, when it is only two or three years old, the other half will remain as a fence till that side become strong again; and then the opposite side may be cut down in its turn; and so on alternately as long as you may incline: by which means the bank will always have a strong hedge upon it without ever becoming naked at the root. And as this plant, when bruised, is one of the most valuable kinds of winter-food yet known for all kinds of domestic animals*, the young tops may be carried home and employed for that purpose by the farmer; which will abundantly compensate for the trouble of cutting, and the waste of ground that is occasioned by the breadth of the bank.

"The other method of preserving a hedge of whins from turning open below, can only be practised where sheep are kept; but may be there employed with great propriety. In this case it will be proper to sow the seeds upon a conical bank of earth, shoved up from the surface of the ground on each side without any ditches. If this is preserved from the sheep for two or three years at first, they may then be allowed free access to it; and, as they can get up close to the foot of the bank upon each side, if they have been accustomed to this kind of food, they will eat up all the young shoots that are within their reach, which will occasion them to send out a great many lateral shoots; and these being continually browsed upon, soon become as close as could be desired, and are then in no sort of danger of becoming naked at the root, although the middle part should advance to a considerable height.

"The fences hitherto mentioned are only intended to preserve fields from the intrusion of cattle; but, on some occasions, it is necessary to have a fence that would even resist the efforts of men to break through it: as around bleaching-fields, orchards, &c.; the want of which often subjects the proprietor of such fields to very disagreeable accidents. And, as such a fence might, on some occasions, be procured at no great expence or trouble, it were to be wished that the method of doing this were more generally known than it is at present. To effectuate this, it is necessary to begin by trenching up or ploughing a large belt all around the field you mean to inclose, of 40 or 50 feet or more in breadth, if you find it convenient: the outer edge of which should be inclosed by a good dike, or a ditch and hedge. This belt should be kept in culture one year, and well manured, if your situation will admit of it; and laid up before winter in such a manner that no water may be allowed to lodge upon it; and planted in the winter-time all over with plants of eglantine so thick as not to be above two feet from one another; and between these put a good number of young birch plants not above two years old, interspersed with hazels, oak, ash, rawn (wild service), and other trees that you think will thrive upon your soil; together with

Fence.

thorns, hollies, brambles, and wood-bine (honeysuckle): and having then fenced it from cattle, and kept down the weeds that may rise upon its surface by the hoe, as long as you can conveniently get access into it, leave it afterwards to nature. If this is done, and your soil be not extremely bad, the belt in a very few years will be entirely filled with a close bush of trees, so intermixed with the bending branches of the eglantine, and bound together by the trailing shoots of the bramble and wood bine, that no animal above the size of a cat could penetrate; especially when it is of such a depth as I have recommended.

"The first hint that I got for a fence of this kind was from a small thicket of brushwood that I had planted for ornament, pretty much in the manner above described; which in a short-time became so much interwoven with the sweet-briar, that it was impossible to find any access into it. But as all kinds of trees and shrubs, if planted very close upon one another, become naked at the root when they arrive at any considerable size, care should be taken to prevent it from ever coming to that state, by cutting it down whenever it becomes in danger of being open at the root. And as it would be improper ever to leave the field entirely defenceless, it is a great advantage to have the belt as broad as it conveniently may be, so that the one half of it may be a sufficient fence; by which means, we will have it in our power to cut down the inside and the outside of the belt alternately, so as still to keep the thicket young, and never to want at any time a sufficient fence; and the brush-wood that this afforded at each cutting would, in almost every situation, yield such a revenue as would do much more than indemnify the proprietor for the rent of the ground that was occupied by this fence. And if the field was in such a situation as required shelter, some trees might be allowed to grow to their full size about the middle, without any inconvenience, if the belt were of a sufficient breadth.

"There is one other species of fencing as useful as any of those already mentioned, which is in general much less understood, and more difficult to execute properly, that deserves here to be taken notice of; *viz.* the method of securing the banks of rivers from being washed away by the violence of the stream, and of preventing the damages that may otherwise be occasioned by the swelling of the waters.

"It frequently happens that, when a river runs in a bed of rich vegetable mould, the least accident that may chance to divert the stream towards any particular part of the bank, causes it to sweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is usually carried to the sea, and the place that the water leaves to occupy the new bed that it thus forms for itself is generally of a much worse quality; consisting chiefly of stones, sand, and gravel. In some cases, where the whole force of the current is quite close to the bank, and the materials necessary for fencing it are not to be found, it may perhaps be impossible or very difficult totally to prevent this evil; but, for the most part, it admits of a cure that can be obtained at a pretty moderate expence.

Fence.

"These ravages are always greatest where the bank rises perpendicularly to a pretty considerable height above the ordinary surface of the water, and never at those places where the banks shelve down gradually towards the water's edge: for, when the river is swelled to a great height by rains, and runs with a force and rapidity greater than usual, it strikes violently against these perpendicular banks that directly oppose its course, which being composed of earth quite bare and uncovered, are easily softened by the water, and quickly washed away; so that the upper part of the bank being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities: whereas at those parts of the bank that shelve gradually downwards to the water's edge, when the river rises to any considerable height, it gently glides along its surface; which being defended by the matted roots of the grass with which it is covered, scarcely sustains any damage at all; and is nearly the same after the water has retired within its banks as before the inundation. These facts, which no one who has bestowed the least attention to this subject can fail to have observed, clearly point out, that the first and most necessary step towards a cure, is to level down the edge of the bank that is next to the water, so as to make it slope gradually down towards the river. If the bank is very high, and you have no other particular use for the earth that must be taken from it, the easiest method of disposing of it, will be to throw it into the river: but, in whatever manner you may dispose of the earth, the slope of the bank must be continued until the inner edge of it is as low as the surface of the water at the driest time of the year, and be made to ascend gradually upwards from the water with an easy slope, till it comes to the level of the ground, or at least rises to such a height as that the water never exceeds. This operation ought to be performed as early in summer as possible, and should be either immediately covered with turf, pared from the surface of some field that has a very strong sward upon it, taking care to lay these in such a manner as to be in as little danger as possible of being washed away by any accidental flood that might happen before they had grown together; or, if the turf of this kind cannot be easily had, it should be sowed very thick with the seeds of some small matt-rooted grass, that should be kept in readiness for this purpose (c).

"If the stream has not been extremely rapid at the foot of the bank, some of the earth that was thrown into the water will be allowed to subside to the bottom, and will there form a bank of loose soft earth, which will be of great use afterwards in preventing the face of the bank under water from being washed away; but, in order to secure this bulwark effectually for the future, the surface of this soft earth ought to be instantly stuck full of the roots of bog-reeds, flags, water-spiderwort, rushes, and other matt-rooted aquatic plants; which, if allowed to remain till they have once struck root, will afterwards form a barrier that nothing will ever be able to destroy. But, if the stream be too rapid to admit of this, and the bank of soft earth is much deeper than the surface of the water, it will be of use to fill up the breast of the bank with loose stones,

carelessly

(c) The creeping meadow-grass, *poa repens*, is a proper grass for this purpose.

Fence,
Fencing.

carelessly thrown in, till they rise near the surface of the water; which would most effectually secure it against any future encroachments, if the bank is sloped away above.

"If it should so happen that stones cannot be easily got for this purpose, the only resource which in this case remains, is to dig the bank so low, that at the undermost edge, it may be always below the surface of the water, and carry it out in this way for a considerable distance, and then stick the whole surface that is below the water full of matt-rooted aquatic plants; which will in a great measure, if not entirely, defend it from any future encroachments. This bank ought to continue to shelve downwards even where it was below water, and those aquatics that will grow in the greatest depth of water be planted on the innermost brink, and the others behind them. The water-spiderwort will grow in four feet depth of water, and the roots of the common yellow-flowered water-iris forms such a strong and compact covering upon the surface of the soil on which it grows, as would defend it from being affected by the water almost as well as if it were a rock: it is likewise an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water.

"If the stratum of soft earth is not so deep as to reach to the surface of the water, and lies upon a stratum of rock or hard gravel, there will be no occasion for throwing in stones of any kind. But, as it is difficult to unite the vegetable mould to any of these strata, there will always be some danger of its separating from these in violent inundations; and if the water once get an entry, it will not fail to grow larger and larger by every future inundation. To prevent this inconvenience, it will be necessary, after you have sloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior stratum with a good many small stones, if they can be found; sowing between them the seeds of any kind of plants that you think are most likely to thrive, which have strong matted roots with as small and flexible tops as possible. You will easily observe, that from the impossibility of ever making earth adhere firmly to stone of any kind, it must always be an improper practice to face the banks of a river to a certain height with stone which is coped at top with earth."

For the most proper methods of raising hedges of different kinds, see HEDGE.

FENCE-Month, the month wherein deer begin to fawn, during which it is unlawful to hunt in the forest.

It commences 15 days before mid-summer, and ends 15 days after it. This month, by ancient foresters, is called *defence-month*.

FENCING, the art of making a proper use of the sword, as well for attacking an enemy as for defending one's self.

This art is acquired by practising with foils, called in Latin *rudes*; whence fencing is also denominated *gladiatura rudiarum*.—It is one of the exercises learnt in the academies (see EXERCISE and ACADEMY); and is an accomplishment both agreeable and useful:—Agreeable, as it affords gentlemen a noble and distinguished amusement:—Useful, as it forms their body;

and furnishes them with the faculty of defence, whether it be of their honour or their life, when the one or the other is attacked by those turbulent and dangerous persons whose correction is of service to society in general.

Pyrrard assures us, that the art of fencing is so highly esteemed in the East-Indies, that none but princes and noblemen are allowed to teach it. They wear a badge or cognizance on their right arms, called in their language *esaru*; which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themselves.

Fencing is divided into two parts, *simple* and *compound*.

Simple is that performed directly and nimbly, on the same line; and is either offensive or defensive.—The principal object of the first, is whatever may be attempted, in pushing or making passes, from this or that point, to the most uncovered part of the enemy. The second consists in parrying and repelling the thrusts aimed by the enemy.

The *compound* includes all the possible arts and inventions to deceive the enemy, and make him leave that part we have a design on bare and unguarded, upon finding we cannot come at it by force, nor by the agility of the simple play. The principal means hereof are, on the offensive side, feints, appeals, clashings, and entanglings of swords, half-thrusts, &c.; and, on the defensive, to push in parrying. Of all which a detail would be here useless, as they are only to be understood and acquired from personal instructions conjoined with practice.

FENELON (Francis de Salignac de la Motte), was of an ancient and illustrious family, and born at the castle of Fenelon in Perigord in 1651. In 1689, he was appointed tutor to the dukes of Burgundy and Anjou; and in 1695 was consecrated archbishop of Cambray. After this preferment, a storm rose against him, that obliged him to leave the court for ever, occasioned by his performance intitled, *An Explication of the Maxims of the Saints concerning the Interior Life*; in which he was supposed to favour the extravagant notions of Madam Guyon, and the principles of Quietism. A controversy on this occasion was for some time carried on between him and M. Bossuet, bishop of Meux: which terminated in an appeal to the pope; when his holiness condemned the archbishop's book, by a brief dated March 12th, 1699. Some friends indeed pretend, that there was more of court-policy than religious zeal in this affair: but be this as it may, the archbishop submitted patiently to this determination; and, retiring to his diocese of Cambray, acquitted himself punctually in all the duties of his station, and led a most exemplary life. The work that gained him the greatest reputation, and which will render his memory immortal, is his *Adventures of Telemachus*; the style of which is natural, the fictions well contrived, the moral sublime, and the political maxims tending all to the happiness of mankind. Hence it is thought, as the printing of this work was stopped at Paris, that the prelate's heresy was in politics instead of religion; and though his disgrace was prior to this work, he had, while he was tutor to the young princes, taught them the same principles asserted and exemplified in *Telemachus*. Fenelon died in 1715; and a collection

Fencing,
Fenelon.

Fennel of all his religious works was afterwards printed at Rotterdam, under the care of the marquis de Fene-
Feodal. lon his grand-nephew, when ambassador to the States-General.

FENNEL, in botany. See **ANETHUM**.

FENTON (Sir Geoffrey), privy-counsellor and secretary in Ireland during the reigns of queen Elizabeth and king James I. is well known for his translation of *Guicciardin's History of the Wars of Italy*, dedicated to queen Elizabeth in 1579. He died at Dublin in 1608; after having married his daughter to Mr Boyle, afterward the great Earl of Corke.

FENTON (Elijah), descended from an ancient family, was born at Shelton near Newcastle, but in what year is uncertain. He was the youngest of 12 children, and was intended for the ministry; but embracing principles contrary to the government, while at Cambridge, he became disqualified for entering into holy orders. After he quitted the university, he was secretary to the earl of Orrery; but seems to have spent the most of his life amongst his friends and relations, and used to pay an annual visit to his elder brother, who enjoyed an estate of L. 1000 a-year. He was a man of great tenderness and humanity, enjoyed the fairest reputation, and was much esteemed by Mr Pope; who, when he died in 1730, paid him the tribute of a very elegant epitaph. He published a volume of poems in the year 1717; and in 1723 was acted his tragedy of Mariamne, built upon her story collected from Josephus in the third volume of the *Spectator*.

FENUGREEK. See **TRIGONELLA**.

FEOD, or **FEUD**, is defined to be a right which a vassal hath in lands or some immoveable thing of his lord's, to use the same, and take the profits thereof hereditarily, rendering unto the lord such feudal duties and services as belong to military tenure, &c. and the property of the soil always remaining to the lord.

FEODAL, of or belonging to a **FEUD** or **FEE**.

FEODAL System, the constitution of **FIEFS** or **FEUDS**.

About 12 centuries ago, this system was so universally received in Europe, that Sir Henry Spelman calls it *the law of nations in our western world*. Hence it deserves our attention in a particular manner; a knowledge of the different feuds being indispensably requisite for a proper understanding either of the civil government of our own country, or the laws by which its landed property is regulated.

Origin of feuds.

The military policy of the Celtic or northern nations, known by the names of *Goths, Vandals, Franks, Huns, and Lombards*, furnished the original constitution or system of feuds. These people pouring out in vast multitudes from the same *officina gentium* or "storehouse of nations," over-ran all the European countries on the declension of the Roman empire. They brought

the feudal system along with them from the countries out of which they emigrated; and, supposing it to be the most proper method of securing their new conquests, they introduced it into their more southerly colonies.

According to this system, the victorious general allotted considerable tracks of land to his principal officers; while they, in like manner, divided their possessions among the inferior officers, and even those common soldiers who were thought to be the most deserving. Allotments of this kind were named *feoda, siefs, fees, or feuds*, from a combination of words, in the language of these barbarians, signifying a reward or stipend bestowed on certain conditions (A). The condition upon which these rewards were given was, that the possessors should faithfully serve the person from whom they were received, both at home and abroad, in the military way. To this they engaged themselves by a *juramentum fidelitatis*, or oath of fealty*; in the event of a breach of which, either by not performing the service agreed upon, by deserting their lord in time of battle, &c. the lands were to return to their original possessor. * See the Article of Feodal Tenure.

Thus the possessors of feudal allotments became interested in the defence of them; and not only the receivers, but those who gave them, were equally and mutually bound to defend their possessions, none of them being able to pretend any right but that of conquest. For this purpose, government and subordination were absolutely necessary; it being impossible to conduct any system of defence where every thing was tumultuous and irregular. Every person, therefore, who was a feudatory, *i. e.* who had received lands, was bound to do every thing in his power to defend the lord of his fee; while, on the other hand, the latter was no less subordinate to his immediate superior; and so on to the prince himself. In like manner a reciprocal bond of defence existed down from the prince to the lowest feudists. 2 General nature of the feudal association.

Such were the foundations on which the feudal system was properly established; and the natural consequence was, a military subjection throughout the whole community. The prince could always collect an army of feudatories ready to defend not only the kingdom in general, but the particular possessions of each person; and the propriety of this constitution was soon apparent in the strength which these newly erected kingdoms acquired, and the valour with which their conquests were defended.

Besides these feudal grants, however, which were held only on the terms of military service above mentioned, there were others called *allodial*, which were given upon more enlarged principles. To these every free man had a title; and could not only claim his territory as well as the rest, but dispose of it at his pleasure. 3 Of allodiality.

(A) We are informed by Pontopiddan; that *ODH* in these northern languages is the same with *proprietas*, and *ALL* with *totum* in the Latin. Hence, among the northern nations, he tells us, that *ODHALL* signifies *right*; and hence we may conjecture, that the *UDAL* right in Finland is derived*. By transposing these two northern syllables, we form the word *ALLODH*; whence we have the etymology of the *allodium* or *absolute* property claimed by the holders of siefs or feuds; and by combining *ODH*, signifying "property," with the word *fee*, signifying, "a conditional stipend or reward," we have the word *FEODH*, signifying, "a property given by way of stipend or reward upon a certain condition."

* See Macdonnell's Inquiry, part 2.

Feodal. pleasure (B); and this freedom was denominated *allodiality*. These allodials, however, were not exempted from military service. A part of their freedom consisted in liberty to go to the wars; for this, in the barbarous times we speak of, was the only way to acquire any degree of renown. Only the slaves were destined to follow the arts of peace; while every free person was not only at liberty to defend his country, but under an obligation to do it in case of any urgent necessity.

4 Feodal and national militia.

5 Different situations of the feodal and of the allodial proprietor.

Thus there was a feodal and a national militia. The free people only were allowed to possess property; the *feodal vassals* constituted the army, properly so called; while the national militia was composed of the allodial proprietors. This allodiality, however, was not confined to landed property, but included likewise moveable estates or money; so that proprietors of the latter kind were obliged also in times of danger to bear arms and appear in the field. Between the feodal and allodial proprietors, however, there was this farther difference, that the latter had no concern with any private quarrels which might take place among the lords themselves; so that they were never obliged to appear in the field unless when called forth by the sovereign against the enemies of the nation at large. This circumstance we might suppose to be an advantage, but it ultimately operated otherwise; becoming the means of changing the allodial right into a feodal tenure. For some time the holders of fiefs had an eminent advantage over the allodial proprietors. This was owing to the imperfection of government in those days; so that the nobles had it in their power to revenge their own quarrels, while the weak were equally exposed to the insults of both parties. The lord and his vassals therefore were always formidable; but the allodial proprietors had scarce any means of defending themselves. The reason of this was, in the first place, that the law did not allow them to commit any hostilities; and in the next, they were too distant and unconnected to form any proper league for mutual de-

fence; and hence proceeded the necessity already hinted at, of converting allodial property into feodal tenure. This was indeed owing in a great measure to the absurdity and violence of the times, by which gifts of property, burthened with service, and which might return to the person who granted them, were rendered superior in value to the absolute and unconditional possession of a subject. Other considerations, however, besides that just mentioned, contributed to produce the same effect. As in those dark ages no right existed but what had its origin in conquest, it thence followed, that the greatest conqueror or warrior was the most honourable person. The king, in whom the whole exploits of the community centred, as being their head, was the most honourable person; all others derived from him that portion of honour which they enjoyed, and which was most nicely adjusted in proportion as they approached him. Allodial proprietors therefore having no pretensions of this kind, were treated with contempt as a kind of poltroons. From this disagreeable situation they wished to free themselves, by converting their allodial property into feodal tenures; while the princes, supposing it their interest to extend those tenures as much as possible, discouraged the allodial possessions. As the feudists supported the importance of the nation and dignity of the monarch, it was not thought proper to allow the allodial proprietors any greater compensations than what were given to vassals in similar cases. Thus they were exposed to continual mortifications in the courts of justice; they were neglected by the king; denied sufficient protection from the laws; exposed not only to continual insults, but to have their property on all occasions destroyed by the great: so that they were without resource except from the feodal tenures, and were obliged even to solicit the privileges which were bestowed in other cases on vassals. In these unhappy circumstances, they were glad to yield up their lands to any superior whom they thought most agreeable, and to receive them back from him as a feodal gift.

Feodal.

6 Conversion of allodium into tenure.

Thus.

(B) The author of *A View of Society in Europe*, has traced the remote sources of the feodal laws in an elegant and spirited manner (Book I. Chap. II. Sect. I.) Tacitus informs us, that the individuals of each of the German nations cultivated by turns a track of land proportionable to their number, for the use of the whole; after which each individual received such an allotment of the cultivated track as his dignity seemed to require. These nations had not altered their political principles at the time they over-ran the Roman empire; and hence the provinces of it were then divided after the same manner. The most considerable allotment was bestowed on the king, as being the most dignified person in the community, and this allotment was styled his *domain*; while the shares of citizens and warriors, which were likewise in proportion to the merit or dignity of each, constituted what was called *allodiality*. But as it often happened that all the land was not exhausted by these partitions, what remained was considered as the property of the community, and in the barbaric codes was called the *lands of the fife*. In such German nations as had thus obtained a settlement, it was necessary that there should be a more close connection betwixt the sovereign and the chiefs, as well as between the chiefs and people, than in others. This was effected by means of the lands of the *fife*; for of these the sovereign took possession, dealing them out to the chiefs under the burthen of appearing in arms whenever he should please to call; while the chiefs in like manner dealt out lands to those called their *retainers*, who were also obliged to supply them with military assistance in cases of necessity. Hence a political system was founded, which had a prodigious effect on society in all those countries where it prevailed. The intention and tendency of this system was to render the nation independent both at home and abroad; for while the people were all armed in their common defence, individuals were also properly guarded against the attacks of despotism. The power of the chiefs, who formed a regular nobility, was a counterpoise to that of the sovereign; while the number of the retainers and vassals, constituting the greatness and power of the nobility, was a proper barrier against aristocratical oppression; for a chief who oppressed his vassals evidently acted against his own interest.

Feodal.

Thus the landed property was every where changed into feudal tenures, and fiefs became universal (c).

7
The feudal incidents.

For some time the feudal system was not only useful in itself, but honourable in its principles; but this continued no longer than while the importers of it into Europe adhered to their original simple and noble maxims. During that period, the lord exercised his bounty to the vassal, which the latter repaid by acts of gratitude; so that the intercourse betwixt them was of the most tender and affectionate kind; and this gave rise to what are called the *feodal incidents*.

The expectants of fiefs were educated in the hall of the superior, while the tenures were precarious or only for life: and even when they became hereditary, the lord took care of the son and estate of his deceased vassal; not only protecting his person, but taking charge of his education, and directing the management of his affairs. He took pleasure in observing his approach to maturity; and when he came of age, never failed to deliver to him the lands, with the care of which he had been entrusted, and which he had been

No 126.

careful to improve. This was called the *incident of wardship*.

The incident of *relief* was founded upon the gratitude of the vassal; who, upon entering on his fief, brought a present to his lord, as an acknowledgment of his care of him during the early part of his life, and in order to conciliate his future regard.

The incident of *marriage* proceeded also upon the principle of gratitude on the part of the vassal. The latter, conscious of the favours he had received, did not choose to ally himself with a family inimical to his chief: while the superior himself, ambitious to aggrandise and augment the importance of his family, sought how to find the most advantageous match for his vassal.

Sometimes the superior himself was reduced in his circumstances by war or other accidents: but from whatever cause his distress proceeded, even though it had arisen from his own extravagance or prodigality, or when only destitute of means to support his ambition or grandeur, his vassals were bound to support and relieve

(c) It has been an object of inquiry to the learned, in what nation of barbarians fiefs had their origin? But it is probable, that they took place in all of these nations nearly about the same time, on the same principles, and were continued by reason of a similarity of manners, conquests, &c. so that we cannot ascribe the prevalence of them to imitation.

* Glanville
Hist. of
Naples,
book iv.
sect. 3.
† L. L. W.
Sgoth, lib. v.
tit. 3.
lib. iv.
tit. 7. l. xx.
‡ See also
Whitaker's
Hist. of
Manchester.
§ Stuart's
Observat. on
the Law and
Constitution
of Scotland.

In France, we find mention made of fiefs as early as the age of Childebert. They were introduced into Italy by the Lombards; among whom the customs and laws relating to fiefs seem very early to have made rapid advances*. They were introduced into Spain before the invasion of the Moors or Saracens in the year 710. Lands were granted for service and attachment among the Goths; among whom also the person who received the gift was the retainer of him who granted it. If he refused his service, the grant was forfeited, and he was said to receive it in *patrocinio*: he also swore fealty to his lord; and on this footing the national militia was regulated†. There can be very little doubt that the feudal law was known in England in the Saxon times, as is mentioned in the text‡. In Scotland, however, the history of fiefs is still more uncertain than any where else; which has been ascribed partly to the mutilated state of the Scottish records, and partly to the want of able antiquaries in the nation. But, according to a late writer§, allodality and feudality have existed ever since the foundation of the Scottish monarchy, and have most probably arisen from a similarity of the manners and customs in Scotland to those of other nations. It has indeed been supposed, that these customs were introduced from some foreign model by Malcolm II. According to some, they were introduced directly from England; and the policy of Malcolm in establishing them has been highly extolled: but, according to our author, there is no foundation for any notion of that kind. Both the opinions just mentioned either directly assert or imply, that the feudal maxims were introduced into this country upon the principle of imitation; but it is very improbable that they could be imported from one people to another, on account of their excessive contrariety to the common usages and precepts of government among mankind. It must undoubtedly have been very absurd, if not altogether impracticable, to transplant the feudal tenures when the grants of land were precarious, or depending entirely on the will of the prince, to a country which had never known superiority or vassalage. This would have required an alteration of all the orders of society from the king to the peasant; while the whole chain of customs, as well as the jurisdiction of the kingdom, both high and low, must have sustained a corresponding alteration, in order to conform them to the new system. It is likewise obvious, that no conquest could be made on purpose to obtain a settlement by any nation who had already received the knowledge of fiefs. The establishment of them implied, that the people had already a fixed and settled residence; and accordingly history does not furnish us with any account of a nation among whom fiefs were known, who ever migrated from the country they already possessed, to seek for one in which they might settle. Feudal institutions must have originated wherever they have been observed to flourish. Scotland was formerly a feudal kingdom, and we know pretty nearly the time when the fiefs were hereditary there: but in that form they could not be introduced by the sovereign; and there was not any nation among whom fiefs were already known who conquered, or made an establishment by conquest, in Scotland. Fiefs therefore must have gradually advanced to such a state of perfection. The progress they made may be likewise easily pointed out. At first they were precarious, or at the pleasure of the lord; afterwards they were granted for life; then for a course of years longer than the natural life of a man; and, lastly, they became hereditary, which was their most perfect stage. This progress has been observed in every country where feudal tenures exist; and the same must have been known in Scotland, though in considering it we are necessarily carried back to periods of remote antiquity; for as fiefs were hereditary as early as the time of Malcolm II. they must have been in their precarious state several centuries before.

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lieve him according to their circumstances; and this was called the *incident of aid*.

The incident of *escheat* took place on the part of the vassal, when, through cowardice, treachery, or any remarkable misbehaviour, he rendered himself unworthy of his fief. In that case, the taking it from him, and giving it to one more worthy, was called an *escheat*.

8
Happiness
of the feo-
dal affoci-
ation.

While the lords and vassals thus vied with one another in mutual acts of friendship and benevolence, universal happiness, liberty, and activity, were diffused thro' the society. The vassals behaved courteously towards the retainers, who were immediately below them; while they again were courted by the lords as constituting their importance and strength; the lords, lastly, giving a like importance and dignity to the sovereign himself. Thus a regular, powerful, and compact system of government took place; an unanimity and attention pervaded the various departments of state; so that while the subjects were free, the nation at large was formidable.

9
The declen-
sion.

During this happy state of affairs, the members of the national assembly in every country in Europe appeared there in arms, whether they came personally or by their representatives. Such particularly was the case under the Anglo-Saxon government; and the happiness they at that time enjoyed made the oppression and tyranny of the Normans appear the more intolerable. In process of time, however, the state of society began to suffer a remarkable alteration. The high and disinterested notions, from which the happiness above mentioned took its origin, declined; the romantic ideas of chivalry* ceased; and much more interested notions of property came in their stead. The separation of the interests of the lords from their vassals was the first step towards the destruction of the feudal system. Thus the incidents, which, as has just now been mentioned, promoted their happiness, did the very reverse. Property being now looked upon as a distinction superior to personal merit, naturally introduced the most mercenary views. In consequence of these the infant ward, the care of whom was wont to be considered as a sacred and honorary trust, was now only looked upon as a mean of procuring emolument to the superior. The latter now regarded the profits of his vassals as so many diminutions of his own wealth. Instead of taking care to improve the estate of his ward as formerly, he impoverished it; not only neglecting the education of the heir, but offering insults to himself; inasmuch that the relations of the unfortunate vassal were frequently obliged to ransom from the avaricious superior both his person and effects. By merchandise of this kind the coffers of princes were filled, and wardships let out to strangers, who might exercise their rapacity with greater freedom. When the vassal at last attained the years of maturity, he came to the possession of his lands without any of that joy and festivity which usually took place on the occasion. He received an inheritance wasted and destroyed, while new grievances daily presented themselves to augment the horrors of his situation. All the incidents, which in former times were so many expressions of gratitude on the part of the vassal, were now changed into taxes which might be exacted at the pleasure of the lord. Before the vassal was invested in his land, the superior exacted from him a

See Ghi-
valry, and
Knights.
10
The per-
fection of
the inci-
dents.

11
Oppressed
situation of
the vassals.

certain sum or other gift, to be measured only by his own rapacity; and in case of delay or inability to pay this demand, the superior continued in possession of the estate. Such scandalous oppression could not but produce the greatest discontent and clamour. Applications were made to the law without success; nor were even the laws regarded which were fabricated on purpose for their relief. The incident of *marriage* now proved a source of the most dreadful oppression. The lord assumed a right of marrying his vassal to whom he pleased; and he not only exerted this right himself, but would sell it to a stranger, or allow the vassal to buy it himself; while the penalty annexed to a marriage without the consent of the superior involved no less punishment than the loss of the estate itself, or some grievous infliction as for a crime of the first magnitude. The case was still worse with a female ward; whose beauty and accomplishments became a source of gain to the superior, or were sacrificed to please his whim or caprice: so that her relations were frequently obliged to buy from him the privilege of marrying her to the person she or they thought most proper. In like manner the *aid*, which was formerly a voluntary gift from the vassal in cases of distress happening to his lord, now became an unavoidable tax. An aid formerly was demanded when the eldest daughter of the superior was married, when his eldest son was knighted, or when the superior himself was taken prisoner in battle. These were the only legal causes of making a demand of this kind: but in the subsequent times of degeneracy, the most frivolous pretences were every day made use of by the prince to oppress the lords, and by the lords to oppress their vassals; demanding subsidies at pleasure, which their inferiors were always obliged to comply with. Lastly, the *escheat*, which in former times took place only in cases of cowardice, treachery, or some other heinous crime, was now inflicted on the most trifling occasions. If the vassal happened to be too long in attending the court of his superior to take the oath of fealty; if he committed any action which could in the least be construed an infringement of the oath; if he neglected to give his lord warning of any misfortune which he might suppose was about to befall him; revealed any thing concerning him; made love to his sister or daughter, &c.; or even if he should grant a tenure of land to another person in form different from that in which he held his own; all these, nay others still more ridiculous, were judged sufficient reasons for the superior to seize on the estate of the vassal, and involve him and his family in ruin.

Notwithstanding these oppressions, however, the vassal was still obliged to submit to his lord; to own him as his superior; and even, in appearance, to pay him the same respect as formerly when the greatest unanimity and cordial affection subsisted between them. Still he was obliged to perform the same military service; because a failure in that respect would have subjected him to a forfeiture of lands according to the original agreement. A vast difference, however, now took place in the valour and activity which inspired the army. The vassals, forced into the field with desponding hearts, were indifferent as to the success of the cause in which they were engaged, and frequently obstructed instead of forwarding the operations of the

Feodal-System.

12
Consequent
degeneracy
of the feo-
dal militia.

Feodal-
System.

13
Expedient
for its re-
covery.

14
Invention
of knight-
service.

field. Hence the sovereign found himself embarrassed; and, though nominally at the head of a martial and powerful people, was frequently unable to effect any thing by reason of the mutual hatred and dissension which every where prevailed.

Thus the feudal states of Europe became unnaturally weak: a remedy was necessary; and it is remarkable, that the same remedy was applied all over the continent. This was, in short, the making fiefs hereditary, which till now had only been granted for a long term of years; and, in return, burdening the lands with a certain number of soldiers, which were not to be refused upon any pretence whatever. Hence was derived the tenure of *knight-service*. A certain portion of land, burdened with the service of one soldier or knight, was called a *knight's-fee*; and thus an estate, furnishing any number of soldiers, was said to contain as many knight's fees; so that now the manours, baronies, &c. became powerful according to the number of soldiers they were bound to furnish. In the grants from the crown, the nobility were obliged to furnish a certain number of soldiers for the service of the sovereign; and in those from the nobility to their vassals, the like service was required. Even the commons who had grants from the crown furnished a certain proportion of knights. The force of the nation was called into action by grants *in capite*, or from the sovereign and nobility. A numerous and powerful army was instantly assembled, and at once ready for action. Of this army the king was the general, the nobility the officers, and the vassals soldiers; the whole being exactly arranged, and capable of entering upon any expedition without the least delay.

Thus a remedy was found in some measure for the weakness of the feudal sovereigns: but though the knights-tenure could accomplish this, it could not bring back the former affection and cordiality which subsisted between the various ranks of people. On the contrary, by uniting them more firmly to one another by legal ties, it rendered matters rather worse. The oppression originating from the operation of the feudal incidents, still continued with unremitting violence. The grants of knights-tenure were attended with the same oaths

of homage and fealty; the same incidents of relief, wardship, marriage, aid, and escheat, with the feudal tenures. The princes promised to abate somewhat of their rigour in demanding the feudal perquisites, but did not keep their word. Laws were occasionally promulgated, and for some time had an effect; but palliatives soon became ineffectual, and a new state of weakness began to commence.

The two remarkable eras in the feudal history are, the time before the invention of knight-service (D), and that during which it continued. Fiefs were in a state of fluctuation from the destruction of the Roman empire till the ninth century; but they were rendered perpetual in France about the year 877, and were generally become so in every country of Europe about the beginning of the tenth. Du Cange, *voce Militia*, gives us an example of a knight-fee in the year 880. By the year 987, when Hugh Capet was raised to the throne of France, knight-service was become general all over Europe, and was introduced into England after having made its appearance in other countries (E). In England, however, there have been several doubts and inquiries among the learned concerning the introduction of the feudal laws. Many are of opinion, that they were first introduced by William the Conqueror; and, consequently, that they were entirely unknown to the Anglo-Saxons: but others think, that they existed among the latter in the same form under which they were continued by the Normans. Dr. Stuart is of opinion, that the Saxons who settled in England could not be strangers to fiefs. He supposes the conformity of manners, which undoubtedly prevailed between the Saxons and other barbarians, a sufficient proof that the hereditary grant of land, as well as the fluctuating state of feudal tenures which preceded it, were known to the former. Collateral proofs are derived from the spirit and tenure of the Anglo-Saxon laws, but especially from the grants of hereditary estates on condition of military service (F). The condition of fiefs under the Anglo-Saxons was very different from what it was afterwards. In their times we find no mention made of those oppressions of which so much notice has already been

Feodal-
System.

15
Two eras
the history
of fiefs.

16
Doubts con-
cerning the
introduc-
tion of the
feodal laws
into Eng-
land.

(D) For the difference between the knights produced by this service and the more ancient ones, or knights of honour, see the article KNIGHT.

(E) Dr Stuart informs us, that it appears from the records of Malcolm IV. in 1153, that knights-service was known in Scotland, and that it was not a novelty at that time. The same author thinks it even probable, that it was known in the time of David I.

(F) The use of entails was known to the Anglo-Saxons; and this practice, as well as the succession to allodial estates, must have contributed very much to establish hereditary fiefs. This opinion seems also to be confirmed by the accounts we have of the great power of many of the nobility among the Anglo-Saxons, and the natural tendency that fiefs must have, in the course of things, to become perpetual, though analogical arguments cannot entirely be depended upon in this case. There is indeed positive evidence that the territory which anciently constituted the kingdom of Mercia belonged to Ethelred as an hereditary fief and earldom. The grant was given him by Alfred when he married his daughter Ethelfleda: and it is likewise attested by Camden, that in the time of Ethelred the earldom of Leicester was an inheritance, and the regular succession of its earls is still known. We are informed also by creditable historians, that Bernicia and Deireland were feudal and inheritable earldoms among the Saxons. The same was true of the county of Cumberland when possessed by the Scottish monarchs. This last appears from the Saxon Chronicle; in which the grant was conveyed by Edmund king of England to Malcolm of Scotland in the following terms: "Edmundus rex totam Cumberland prædavit et contrivit, et commendavit eam Malcom regi Scotiæ; hoc pacto, quod in auxilio sibi foret terra et mari." From the use of the word *commendavit*, indeed, Spelman takes occasion to say, that a feudal homage was not intended: but the contrary may be proved by the original Saxon from which the fore-

going

been taken: and this may easily be accounted for from the alteration of the feudal spirit in different ages. During the time that a warm and generous affection subsisted between the feudal superiors and vassals, the incidents were marks of generosity on the one part, and gratitude on the other; but as soon as a variance had taken place, by reason of the interested disposition which the introduction of luxury produced, the same incidents became sources of the most flagrant oppression. This was remarkably the case in the time of William the Conqueror; and, during the reign of king John, matters were come to such a crisis, that the people every where complained loudly, and demanded the restoration of the laws of Edward the Confessor (G). "What these laws of Edward the Confessor were (says Mr Hume), which the English every reign during a century and an half desired so passionately to have restored, is much disputed by antiquarians; and our ignorance of them seems one of the greatest defects of the ancient English history." Dr Stuart has offered an explanation; but this is in fact no more than a conjecture, that "by the laws or customs of the Confessor, that condition of felicity was expressed which had been enjoyed during the fortunate state of the feudal association. The cordiality, equality, and independence, which then prevailed among all ranks in society, continued to be remembered in less prosperous times, and occasioned an ardent desire for the revival of those laws and usages which were the sources of so much happiness."

18
Distinction
concerning
fiefs in the
Anglo-Saxon
and the
Anglo-Norman
times.

Besides the great distinction (of which an account has already been given) between the state of fiefs under the Anglo-Saxons and under the Normans, they were no less distinguished by the introduction of knight-service. Hitherto the refinement of the English had been obstructed by the invasion of the Danes, and the insular situation of the kingdom; but after the Norman conquest the fiefs were made perpetual. Still, however, the knight-fee and knight-service were altogether unknown. William, the sixth prince who enjoyed the duchy of Normandy, was well acquainted with every thing relating to fiefs; for that duchy had experienced all the variety incidental to them from the time of its being granted to Rollo by Charles the Simple in the year 912, to the year 1066, when Wil-

liam was put in possession of England by the battle of Hastings.

On his accession to the throne, a number of forfeitures took place among those who had followed the fortune of Harold. Their estates were to be disposed of at the pleasure of the conqueror; and it was natural to suppose that he would follow the method practised in his own country. Hence the origin of knight-service in England. A grant of land, to any person whatever, was estimated at a certain number of knights fees; and each of these required the service of a knight. The grants of lands were even renewed to the old tenants under this tenure; so that by degrees the whole military people in the kingdom acquiesced in it. To accomplish this, *DOMESDAY Book* is supposed to have been compiled, which contained an exact account of all the landed property of the kingdom. Hence it is to be concluded, not that William introduced fiefs into England, as some have imagined, but that he brought them to their ultimate state of perfection by the introduction of knight-service. This is evident from the laws enacted during his reign. In these it is not only mentioned that knight-service was enacted, but that it was done expressly with the consent of the common council of the nation; which at that time was equivalent to an act of parliament (H).

The invention of knight-service proved generally agreeable: for as only few of the Anglo-Saxon fiefs were hereditary, the advancement of the rest to perpetuity, under the tenure of knight-service, must have been accounted an acquisition of some importance; as not only augmenting the grandeur and dignity of the sovereign, but securing the independence of the subject, and improving his property. In the happy state of the feudal association, there was indeed no necessity for the knight's fee; but when the discordance and oppression so often mentioned began to take place, it became then necessary to point out particularly every duty of the vassal, as well as of the lord; and this was fully done by the invention of knight-service. The nobles possessed duchies, baronies, and earldoms; which extensive possessions were divided into as many fees, each of them to furnish a knight for the service of the king, or of the superior: so that every feudal state could command a numerous army

D d 2

and

going is a Latin translation; and the word, according to several learned critics, signifies feudal homage with the most strict propriety. Thus Du Cange informs us, that *commendare se alicui* was the general expression for *faire l'hommage a un seigneur*.

(G) The laws which are now extant under the name of Edward, are generally allowed to be of doubtful authenticity; nor are they, even supposing them to be genuine, of any use in answering the present question. They determine indeed the existence of fiefs among the Anglo-Saxons: and Dr Stuart is of opinion, that the compilation which goes under the name of this prince, though posterior to the date it bears, nevertheless merits greater attention than has usually been bestowed upon it. M. Honard, a foreign-lawyer, is the latest writer who has made it his study; but he is better acquainted with the Norman than the Anglo-Saxon customs.

(H) The following law of William the Conqueror not only makes express mention of the knight's fee and service, but alludes to a former law of William and his parliament, by which this tenure was actually established. "Statuimus etiam et firmiter precipimus, ut omnes comites, et barones, et milites, et servientes, et universi liberi homines totius regni nostri predicti, habeant et teneant se semper bene in armis, et in equis, ut decet et oportet, et quod sint semper prompti et bene parati ad servitium suum integrum nobis explendum, et peragendum, cum semper opus adfuerit, secundum quod nobis debent de feodis et tenementis suis de jure facere, et sicut illis statuimus per commune consilium totius regni nostri predicti, et dedimus et concessimus in feodo jure hereditario." *LL. Guill. c. 58.*

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System.

and militia to support and defend it in case of any emergency. The knights were also bound to assemble in complete armour whenever the superior thought proper to call, and to hold themselves in readiness for action whenever the king or superior found it convenient to take the field: so that thus the militia might be marched at the shortest notice to defend or support the honour of the nation.

The knights were usually armed with an helmet, sword, lance, and shield; and each was besides obliged to keep a horse. This last requisite was owing to the contempt into which the infantry had fallen through the prevalence of tournaments and luxuries of various kinds, though it was by means of the infantry that the barbarians had originally distinguished themselves in their wars with the Romans, and become able to cope with these celebrated warriors. All proprietors of fees or tenants by knight-service fought on foot: the cavalry were distinguished by the name of *battle*; and the success of every encounter was supposed to depend on them alone. They only were completely armed; the infantry, being furnished by the villages under the jurisdiction of the barons, had at first only bows and slings; though afterwards they were found worthy of much greater attention.

21
Its ineffica-
cy and cor-
ruption.

While the feudal association remained in perfection, the superior could at any time command the military service of his vassals; but in the subsequent degeneracy this service could neither be depended upon when wanted, nor was it of the same advantage when obtained as formerly. The invention of knight-service tended in a great degree to remedy this inconvenience. Those who were possessed of knights fees were now obliged to remain 40 days in the field at their own expence; and this without exception, from the great crown vassals to the smallest feudatories; but if longer service was required, the prince was obliged to pay his troops. In those times, however, when the fate of nations was frequently decided by a single battle, a continuance in the field for 40 days was sufficient for ordinary occasions.

Thus matters seemed once more to be restored nearly to their former state. It was now, as much as ever, the interest of the nation to act with unanimity in its defence, not only against foreign enemies, but against the tyranny of the prince over his subjects, or of one part of the subjects over the other. New inconveniences, however, soon began to take place, owing to the gradual improvements in life and the refinement of manners. From the first institution of military service, a fine had been accepted instead of actual appearance in the field. In the times of barbarity, however, when men accounted rapine and bloodshed their only glory, there were but few who made an offer of this compensation; but as wealth and luxury increased, and the manners of people became softer, a general unwillingness of following the army into the field became also prevalent. A new tenure, called *escuage*, was therefore introduced; by which the vassal was only obliged to pay his superior a sum of money annually instead of attending him into the field*. Hence originated taxes and their misapplication; for as the king was lord paramount of the whole kingdom, it thence happened that the whole *escuage* money collected

* See the
particular
consequen-
ces of this
under the
article
*Knight-
Service*.

throughout the nation centred in him. The princes then, instead of recruiting their armies, frequently filled their coffers with the money, or dissipated it otherwise, hiring mercenaries to defend their territories when threatened with any danger. These being composed of the dregs of the people, and disbanded at the end of every campaign, filled all Europe with a disorderly banditti, who frequently proved very dangerous to society. To avoid such inconveniences, standing armies were introduced, and taxations began to be raised in every European kingdom. New inconveniences arose. The sovereigns in most of these kingdoms, having acquired the right of taxation, as well as the command of the military power, became completely despotic: but in England the sovereign was deprived of this right by Magna Charta, which was extorted from him, as related under the article *ENGLAND*, n° [153]; so that, though allowed to command his armies, he could only pay them by the voluntary contributions of the people, or their submitting to such taxations as were virtually imposed by themselves.

FEOFFMENT, in law, (from the verb *feoffare* or *infeudare*, "to give one a feud"); the gift or grant of any corporeal hereditament to another. He that so gives, or enfeoffs, is called the *feoffors*; and the person enfeoffed is denominated the *feoffee*.

This is plainly derived from, or is indeed itself the very mode of, the ancient feudal donation; for though it may be performed by the word "enfeoff" or "grant," yet the aptest word of feoffment is *do* or *dedi*. And it is still directed and governed by the same feudal rules; insomuch that the principal rule relating to the extent and effect of the feudal grant, *tenor est qui legem dat feudo*, is in other words become the maxim of our law with relation to feoffments, *modus legem dat donationi*. And therefore, as in pure feudal donations, the lord, from whom the feud moved, must expressly limit and declare the continuance or quantity of estate which he meant to confer, *ne quis plus donasse presumatur, quam in donatione expresserit*; so, if one grants by feoffment lands or tenements to another, and limits or expresses no estate, the grantee (due ceremonies of law being performed) hath barely an estate for life. For, as the personal abilities of the feoffee were originally presumed to be the immediate or principal inducements to the feoffment, the feoffee's estate ought to be confined to his person and subsist only for his life; unless the feoffer, by express provision in the creation and constitution of the estate, hath given it a longer continuance. These express provisions are indeed generally made; for this was for ages the only conveyance, whereby our ancestors were wont to create an estate in fee-simple, by giving the land to the feoffee, to hold to him and his heirs for ever; though it serves equally well to convey any other estate of freehold.

But by the mere words of the deed the feoffment is by no means perfected: there remains a very material ceremony to be performed, called *livery of seisin*; without which the feoffee has but a mere estate at will. See *SEISIN*.

FERÆ, in zoology, an order of quadrupeds. See *ZOOLOGY*.

FERALIA, in antiquity, a festival observed a-

mong

Feodal-
System
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Feralia

22
Rise of
standing
armies, &c.

Feralia
||
Feretrum.

mong the Romans on February 21st, or, according to Ovid, on the 17th of that month, in honour of the manes of their deceased friends and relations.

Varro derives the word from *inferi*, or from *fero*; on account of a repast carried to the sepulchres of such as the last offices were that day rendered to. Festus derives it from *ferio*, on account of the victims sacrificed. Vossius observes, that the Romans called death *fera*, "cruel," and that the word *feralia* might arise thence. —Macrobius Saturn. lib. i. cap. 13. refers the origin of the ceremony to Numa Pompilius. Ovid, in his Fasti, goes back as far as Æneas for its institution. He adds, that on the same day a sacrifice was performed to the goddesses Muta, or Dumb; and that the persons who officiated were an old woman attended with a number of young girls.

During the continuance of this festival, which lasted eleven days, presents were made at the graves of the deceased, marriages were forbidden, and the temples of the gods shut up. While the ceremonies continued, they imagined that the ghosts suffered no punishments in hell, but that their tormentors allowed them to wander round their tombs, and feast upon the meats which their surviving friends had prepared for them.—For a more particular account of the offerings and sacrifices and feasts for the dead, see *INFERIÆ* and *SILICERNIUM*.

Sometimes at the feralia public feasts were given to the people at the tombs of the rich and great by their heirs or particular friends.

FER DE FOURCHETTE, in heraldry, a cross having at each end a forked iron, like that formerly used by soldiers to rest their muskets on. It differs from the cross-fourché, the ends of which turn forked; whereas this has that sort of fork fixed upon the square end. See *HERALDRY*.

FER de Moulin, Milrinde, Inke de Moulin, in heraldry, is a bearing supposed to represent the iron-ink, or ink of a mill, which sustains the moving mill-stone.

FERDINAND V. king of Spain, called *the Catholic*, which title was continued to his successors. He married Isabella of Castile, by which that kingdom was united to the Spanish crown. This illustrious couple laid the foundation of the future glory and power of Spain. The conquest of Granada, and the discoveries of Christopher Columbus, make this reign a celebrated era in the history of Spain. He died in 1516, aged 63. See (*History of*) *SPAIN*.

FERENTARII, in Roman antiquity, were auxiliary troops, lightly armed; their weapons being a sword, bow, arrows, and a sling.

FERENTINUM, (anc. geog.), a town of the Hernici in Latium, which the Romans, after subduing that nation, allowed to be governed by its own laws. Now *Ferentino*, an episcopal city in the Campania of Rome. E. Long. 14. 5. N. Lat. 41. 45.

FERENTUM, or *FORENTUM*, (anc. geog.), a town of Apulia in Italy. Now *Forenza*, in the Basilicata of Naples.

FERETRIUS, a surname of Jupiter, *a ferendo*, because he had assisted the Romans; or *a feriendo*, because he had conquered their enemies under Romulus. He had a temple at Rome built by Romulus. It was there that the spoils called *opima* were always carried.

FERETRUM, among the Romans, the bier used

in carrying out the bodies of the dead, which duty was performed by the nearest male relations of the deceased: thus, sons carried out their parents, brothers their sisters, &c.

FERG, or *FERGUE*, (Francis Paul), a charming landscape-painter, was born at Vienna in 1689, and there learned the first principles of his art. He successively practised under Hans Graf, Orient, and Thiele. This last, who was painter to the court of Saxony, invited him to Dresden to insert small figures in his landscapes. Ferg thence went into Lower Saxony, and painted for the duke of Brunswick and for the Gallery of Salzdahl. From Germany he went to London, where he might have lived in the highest esteem and affluence, if, by an indiscreet marriage, he had not been so effectually depressed, that he was ever after involved in difficulties. The necessities which arose from his domestic troubles, compelled him to diminish the prices of his paintings, in order to procure an immediate support; and as those necessities increased, his pictures were still more sunk in their price, though not in their intrinsic value. By a series of misfortunes he was over-run with debts; and to avoid the pursuit of his creditors, he was constrained to secrete himself in different parts of London. He died suddenly in the street one night as he was returning from some friends about the year 1738, having not attained his 50th year; and left four children. This pleasing artist, Mr Walpole observes, had formed a manner of his own from various Flemish painters, though resembling Poelenburg most in the enamelled softness and mellowness of his colouring: but his figures are greatly superior; every part of them is sufficiently finished, every action expressive. He painted small landscapes, fairs, and rural meetings, with the most agreeable truth; his horses and cattle are not inferior to Wouvermans; and his buildings and distances seem to owe their respective softness to the intervening air, not to the pencil. More faithful to nature than Denner, he knew how to omit exactness, when the result of the whole demands a less precision in parts. The greatest part of his works are in London and Germany; and they now bear such a price as is the most indubitable evidence of their real merit. He also etched well with aquafortis; and his prints of that kind are esteemed by the curious.

FERGUS, the name of three kings of Scotland. See (*History of*) *SCOTLAND*.

FERGUSON (James), an eminent experimental philosopher and mechanic, was born in Scotland, of very poor parents. At the earliest age his extraordinary genius began to exert itself. He first learned to read, by overhearing his father teach his elder brother: and he had made this acquisition before any one suspected it. He soon discovered a peculiar taste for mechanics, which first arose on seeing his father use a lever. He pursued this study a considerable length, even whilst very young; and made a watch in woodwork, from having once seen one. As he had no instructor, nor any help from books, every thing he learned had all the merit of an original discovery; and such, with infinite joy, he believed it to be. As soon as his age would permit, he went to service; in which he met with hardships, which rendered his constitution feeble through life. Whilst he was servant to a farmer (whose

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(whose goodness he acknowledges in the modest and humble account of himself which he prefixed to his last publication), he frequently contemplated the stars; and began the study of astronomy, by laying down, from his own observations only, a celestial globe. His kind master, observing these marks of his ingenuity, procured him the countenance and assistance of his superiors. By their help and instructions, he went on gaining farther knowledge, and was sent to Edinburgh. There he began to take portraits; an employment by which he supported himself and family for several years, both in Scotland and England, whilst he was pursuing more serious studies. In London he first published some curious astronomical tables and calculations; and afterwards gave public lectures in experimental philosophy, which he repeated (by subscription) in most of the principal towns in England, with the highest marks of general approbation. He was elected a Fellow of the Royal Society, without paying for admission (an honour scarcely ever conferred on a native); and had a pension of 50*l.* *per ann.* given him, unsolicited, by our gracious king, at his accession, who had heard lectures from him, and frequently sent for and conversed with him on curious topics. He also received several presents from his majesty, the patron of real merit. To what a degree of consideration Mr Ferguson mounted by the strength of his natural genius, almost every one knows. He was universally considered as at the head of astronomy and mechanics in this nation of philosophers. And he might justly be styled self-taught, or rather heaven taught; for in his whole life he had not above half a year's instruction at school. He was a man of the clearest judgment, and the most unwearied application to study; benevolent, meek, and innocent in his manners as a child: humble, courteous, and communicative; instead of pedantry, philosophy seemed to produce in him only diffidence and urbanity,—a love for mankind and for his Maker. His whole life was an example of resignation and Christian piety. He might be said to be an enthusiast in his love of God, if religion, founded on such substantial and enlightened grounds as his was, could be styled enthusiasm. He died in 1776.

FERIÆ, in Roman antiquity, holidays, or days upon which they abstained from work. Proclamation was generally made by the herald, by command of the *Rex Sacrorum*, or *Flamines*, that all should abstain from business; and whoever transgressed the order was severely fined.—The feriz were of two kinds, public and private.

The public Feriz were fourfold. 1. *Stativæ*, which were kept as public feasts by the whole city upon certain immoveable days appointed in their kalendar;—such were the *Compitalia*, *Carmentalia*, *Lupercalia*, &c. 2. *Feriz Conceptivæ*, which were moveable feasts, the days for the celebration of which were fixed by the magistrates or priests; of this sort were the *Feria Latina*, *Paganalia*, *Compitalia*, &c. which happened every year, but the days for keeping them were left to the discretion of the magistrates or priests. 3. *Feria Imperativæ*, which were fixed and instituted by the mere command of consuls, prætors, dictators, upon the gaining of some victory or other fortunate event. 4. *Nundinæ*. See the articles NUNDINÆ, AGONALIA, CARMENTALIA, &c.

The private Feriz were holidays observed by particular persons or families on several accounts, as birth-days, funerals, &c. The feriz belonged to, and were one division of, the *dies festi*. See FESTI.

FERIÆ *Latine*, a festival at which a white bull was sacrificed, and the Latin and Roman towns provided each a set quantity of meat, wine, and fruits; and during the celebration, the Romans and Latins swore eternal friendship to each other, taking home a piece of the victim to every town. The festival was instituted by Tarquinius Superbus when he overcame the Tuscans and made a league with the Latins, proposing to build a common temple to Jupiter Latialis, at which both nations might meet and offer sacrifices for their common safety. At first the solemnity lasted but one day, but it was at different times extended to ten. It was held on the Alban mount, and celebrated with chariot races at the capitol, where the victor was treated with a large draught of wormwood drink.

FERIA, in the Romish breviary, is applied to the several days of the week; thus Monday is the *feria secunda*, Tuesday the *feria tertia*; though these days are not working days, but holidays. The occasion of this was, that the first Christians were used to keep the easter-week holy, calling Sunday the *prima feria*, &c. whence the term *feria* was given to the days of every week. But besides these, they have extraordinary feriz, viz. the three last days of passion-week, the two following easter-day, and the second feriz of rogation.

FERIANA, the ancient city of Thala in Africa, taken and destroyed by Metellus in the war with Jugurtha. It was visited by Mr Bruce in his late travels through Africa, who expected to have found many magnificent ruins in the place, but was disappointed. The only remarkable objects he met with were the baths, which are excessively warm. These are without the town, and flow from a fountain named *El Yarnid*. Notwithstanding the excessive heat of its water, the fountain is not destitute of fishes. They are of the shape of a gudgeon, above four inches in length; and he supposed that there might have been about five or six dozen of them in the pool. On trying the water with a thermometer, he found the heat so great, that he was surprised the fish were not boiled in it. That fish should exist in this degree of heat, is very surprising; but it seems no less wonderful that Mr Bruce, while standing naked in such water, should leisurely make observations on its heat, without suspecting that he himself would be boiled by continuing there. We have to regret that the accidental wetting of the leaf on which he wrote down his remarks has deprived the public of the knowledge of the precise degree to which the thermometer is raised by this water. The fish are said to go down the stream to some distance during the day, and to return to the spring or warmest part at night.

FERMANAUGH, a county of Ireland, in the province of Ulster; bounded by Cavan on the south, Tir-Oen on the north and north-east, by Tyrconnel on the north-west, Leitrim on the south-west, and Monaghan on the west. It is 38 miles long and 24 broad. A great part of it is taken up with bogs; and the great lake called *Lough-Earne*, which is near 20 miles in length, and in some places 14 in breadth, diversified with upwards of 300 islands, most of them well wood-

Feriz
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Ferment,
Fermenta-
tion.

ed, inhabited, and covered with cattle. It abounds also with great variety of fish, such as huge pike, large bream, roach, eels, trout, and salmon. The water of the lake in some places is said to have a particular softness and liminess, that bleaches linen much sooner than could be done by other water. The lake is divided into the Upper and Lower, between which it contracts itself for five or six miles to the breadth of an ordinary river. In one part of the county are marble rocks 50 or 60 feet high. This county sends four members to parliament, viz. two for the shire, and two for Inniskillen the capital. Fermaugh gives the title of viscount to earl Verney.

FERMENT, any body which being applied to another, produces fermentation.

Ferments are either matters already in the act of fermentation, or that soon run into this act. Of the first kind are the flowers of wine, yeast, fermenting beer, or fermenting wine, &c. and of the second are the new expressed vegetable juices of summer fruit.

Among distillers, ferments are all those bodies which, when added to the liquor, only correct some fault therein, and, by removing some obstacle to fermentation, forward it by secondary means: as also such as, being added in time of fermentation, make the liquor yield a larger proportion of spirit, and give it a finer flavour.

FERMENTATION, may be defined a sensible internal motion of the constituent particles of a moist, fluid, mixed or compound body; by the continuance of which motion, these particles are gradually removed from their former situation or combination, and again, after some visible separation is made, joined together in a different order and arrangement, so that a new compound is formed, having qualities very sensibly different from those of the original fluid.

Subjects of
fermenta-
tion.

Fermentation, properly so called, is confined to the vegetable and animal kingdoms; for the effervescences between acids and alkalies, however much they may resemble the fermentation of vinous liquors, are nevertheless exceedingly different. It is divided into three kinds; or rather, there are three different stages of it, viz. the vinous, the acetous, and the putrefactive. Of the first, vegetables alone are susceptible; the flesh of young animals is in some slight degree susceptible of the second (A); but animal substances are particularly susceptible of the third; which vegetables do not so easily fall into without previously undergoing the first and second. The produce of the first stage is wine, or some other vinous liquor; of the second, vinegar; and of the third, volatile alkali. See BREWING, VINEGAR, &c.

Fermentation is one of the most obscure processes in nature, and no attempt has been made to solve it with any degree of probability. All that we know with regard to it is, that the liquor, however

clear and transparent at first, no sooner begins to ferment, than it becomes turbid, deposits a sediment, emits a great quantity of fixed air, and throws up a scum to the top, acquiring at the same time some degree of heat. The heat of the vinous stage, however, is but moderate, seldom or never exceeding that of the human body. The heat of the acetous is considerably greater; and that of the putrefactive is the greatest of all, inasmuch that putrefying substances, when heaped together in great quantities, will sometimes break forth into actual flame.

Fermenta-
tion.

Phenomena
of it.

From these phenomena, fermentation would seem to be a process ultimately tending to the entire dissolution of the fermenting substance, and depending upon the action of the internal heat, ethereal fluid, or whatever else we please to call it, which pervades, and makes an essential ingredient in, the composition of all bodies. From such experiments as have been made upon this subject, it appears, that whether fixed air is the bond of connection between the particles of terrestrial bodies or not, yet the emission of it from any substance is always attended with a dissolution of that substance. We cannot, however, in the present case, say that the emission of the fixed air is the cause of the fermentation. It is in fact otherwise. Fixed air hath no tendency to fly off from terrestrial substances with which it is united; on the contrary, it will very readily leave the atmosphere after it hath been united with it, to join itself to such terrestrial substances as are capable of absorbing it. The emission of it, therefore, must depend upon the action of some other fluid; most probably the fire or heat, which is dispersed thro' all substances in a latent state, and in the present case begins sensibly to manifest itself. But from what cause the heat originally begins to operate in this manner, seems to be entirely unknown and inexplicable, except that it appears some how or other to depend on the air; for, if that is totally excluded, fermentation will not go on.

Attempt
to explain
the phenomena.

In the Memoirs of the Manchester Society, Mr Henry gives an account of some experiments, in which he produced fermentation not only in bread and wort, but in liquors which we should think quite incapable of it, viz. punch and whey. Having previously suspected, from some observations and experiments, that yeast was only a quantity of fixed air involved and detained among the mucilaginous parts of the fermenting liquor, he attempted to prepare it in the following manner. Having boiled wheat-flour and water to the consistence of a thin jelly, he put this viscous fluid into the middle part of Dr Nooth's machine for impregnating water with fixed air. The gas was absorbed in considerable quantity; and next day the matter was in a state of fermentation. The third day it had acquired so much of the appearance of yeast, that an experiment was made on some paste for bread; and after five or six hours baking, it

Mr Henry's experiments on producing fermentation by impregnating the liquor with fixed air.

(A) Under the article CHINA, n° 114. a fact is mentioned which seems to show that animal substances are likewise capable of the vinous fermentation; viz. that the Chinese make use of a certain liquor called *lamb-wine*, and likewise that they use a kind of spirit distilled from *sheep's flesh*. This is related on the credit of M. Grosier: but as he does not mention the particulars of the process, we are at liberty to suppose that the flesh of these animals has been mixed with rice, or some other ingredients naturally capable of producing a vinous liquor; so that, instead of contributing any thing to the fermentation in question, they may in reality be detrimental, and furnish only that strong and disagreeable smell complained of in the liquid.

Fermenta-
tion.

it was found to have answered the purpose tolerably well. Another experiment was made with wort; but here the artificial yeast was not made use of. Instead of this, part of the wort itself was put into Nooth's machine, and impregnated with fixed air, of which it imbibed a large quantity. On being poured into the remainder of the liquor, a brisk fermentation came on in 24 hours, "a strong head of yeast began to collect on its surface, and on the third day it seemed fit for tuning." In prosecuting the experiment, good bread was made with the yeast taken off from the surface; and beer was produced by keeping the fermented liquor, and good ardent spirit produced by distilling it. In another experiment, in which a fourth part of the wort was impregnated but not saturated with fixed air, the fermentation did not commence so soon, though it is probable that it would also have taken place at last without any farther addition. The experiment commenced about midnight; but in the morning there were no signs of fermentation. At five in the afternoon there was only a slight *mantling* on the surface. A bottle with a perforated stopper and valve containing an effervescing mixture of chalk and vitriolic acid was then let down to the bottom of the vessel; the discharge of air from this mixture was going on rapidly at nine o'clock; while the liquor at the same time seemed to be in a state of effervescence. At 11 o'clock the bottle was withdrawn, as the fermentation was commenced beyond a doubt, the liquor having a pretty strong head of yeast upon it. Next day the fermentation seemed to be on the decline, but was recovered by a second immersion of the mixture. When the vinous fermentation was finished, the liquor, by being kept too long, was found converted into vinegar; so that in the course of these experiments, ale, bread, yeast, ardent spirit, and vinegar, had all been produced.

5
Remarks
on them.

From these experiments it would seem natural to suppose that fixed air was the *cause* of fermentation, contrary to what has been already laid down. But in fact there is not any contradiction here to the position just mentioned; for the quantity of fixed air introduced into the liquor on Mr Henry's experiments was too great for it to contain. Some part of the latent heat by which the elasticity of that fluid is produced may likewise have been absorbed, and disposed the liquor to run into the fermenting state sooner than it would otherwise have done. Or, perhaps, when any fluid substance of the aqueous kind contains an extraordinary proportion of fixed air, it may be thus inclined to run into the fermentative process, by some disposition of the air itself to reassume its elastic state. This seems probable from Mr Henry's experiments with Pyrmont water. Having made some punch with an artificial water of this kind, he put a pint of it into a quart bottle and stopped it with a cork. On opening it three or four days after, he found that it creamed and mantled like the briskest bottled cyder; so that it was taken for some delicious liquor hitherto unknown. This length of time he found was necessary to give the briskness just mentioned to the fluid; for artificial Pyrmont water itself assumes a brisk and sparkling appearance after being kept three or four days, though it has it not at first, unless a very great quantity of air be forced into it at its preparation. In like manner a quan-

N^o 126.

tity of whey, impregnated with fixed air, was changed into a brisk and sparkling vinous liquor by keeping for some time in a bottle loosely corked.

Fermenta-
tion.

On certain substances, however, both fluid and solid, fixed air hath a different effect. Thus, when mixed with alkaline salts, whether fixed or volatile, fluid or solid, it first neutralises, and then renders them acid, without the least tendency to fermentation, unless an acid be added. Then indeed a great effervescence will ensue; but this, as we have already said, is not a true fermentation. On calcareous earths its effect is somewhat singular: for these earths, when pure, are soluble in water; when joined with a certain proportion of fixed air, they become insoluble; and with an over-proportion they become soluble again; but none of them show any disposition to fermentation, though kept ever so long in either state. As water therefore contains a great quantity of latent heat which it readily parts with, the probability still is, that a disposition to unite with the solid part of fixed air exists in that element, rather than to remain combined with the water. It is likewise well known that all fermentable substances, such as the juices of ripe fruits, sugar, &c. contain much fixed air, and therefore fall spontaneously into fermentation when kept in a gentle warmth. This last circumstance supplies a quantity of sensible heat, or elementary fire acting in its expansive form, which the water more readily parts with than that which acts upon its own particles in such a manner as to keep them easily moveable upon one another, and thus occasion its fluidity. Other substances contain less fixed air, as infusion of malt, potatoes, turnips, &c. whence it is necessary to add an extraordinary quantity to them, either enveloped in mucilaginous matter which is analogous to yeast, or pure as was done by Mr Henry.

Thus we may suppose fermentation to consist in the action of elementary fire expanding the fixed air naturally contained in the fluid, or artificially introduced into it; in consequence of which certain changes are produced in the nature of the fluid itself; and it becomes a vinous, acetous, or putrid liquor, according to the degree of action which takes place. This seems to coincide with the opinion of Dr Penington of Philadelphia, who, in his inaugural dissertation on this subject, makes a change of the sensible qualities of the substance the only criterion of fermentation. Hence he denies that any true fermentation exists in the raising of bread, as is commonly supposed; and indeed his arguments on this subject seem decisive. To ascertain this, he put into a retort some dough which had been raised in three quarters of an hour; and, on applying a gentle heat, some aqueous liquid came over, which did not show the least vestige of vinous spirit, though the remainder of the same dough afforded a good and well fermented bread. On adding a little water to the dough which remained in the retort, and letting the mixture stand in a gentle warmth for nine hours, no sign of fermentation appeared; but in 16 hours the process seemed to have been going on for some time; and on distillation yielded a small quantity of vinous spirit. Hence it appears that flour requires more than nine hours before it ferments; but as bread frequently rises in one hour, the processes must some how or other be essentially different. "From a variety of facts (says our author),

6
Dr Penington's
opinion.7
His experiments
on the fermentation
of bread.

Fermenta-
tion.8
His expla-
nation of
the process.

thor), I am induced to give the following explanation of the process (making of bread). Yeast is a fluid containing a large quantity of fixed air or aerial acid; and the proportion is greater as the fluid is colder. As soon as the yeast is mixed with the dough, heat is applied; this extricates the air in an elastic state; and as it is now diffused through every particle of dough, every particle must be raised; the viscosity of the mass retains it: it is now baked, and a still greater quantity of air is extricated by the increased heat; and as the crust forms, the air is prevented from escaping; the water is dissipated: the loaf is rendered somewhat dry and solid; and between every particle of bread we find a particle of air, as appears from the spongy appearance of the bread, owing to the apparent vacancies which the air had made by insinuating itself into it." This explanation he finds also confirmed by what is called the *falling* of bread after it has once been raised; and which takes place so rapidly, that we cannot suppose the process of fermentation to have been finished in the time: nay, bread will fall before we are warranted from his experiment to say that the fermentation is well begun; for this, as we have seen, required between 9 and 16 hours.

That bread is raised, not by a proper fermentation, but by a mere effervescence or escape of fixed air, is likewise evident from several facts mentioned by Dr Pennington. In Philadelphia, the bakers find some difficulty in getting good yeast in the summer-time, on account of the heat of the weather, which very soon turns it sour. In this case, they dissolve a small quantity of potash in water, and mix it with their yeast; when the effervescence produced between the acid and alkali produces such a discharge of fixed air, as raises the bread in less than ten minutes. He informs us also, on the authority of Dr Rush late professor in the college of Philadelphia, that "near Saratoga there are two mineral springs, the waters of which have all the properties of the famous Pyrmont water, being highly impregnated with fixed air. When this water is mixed with flour into dough, it is sufficient, without yeast, to make a very light and palatable bread." A third fact is still more decisive. "I procured (says the Doctor) some nice crystals of the salt formed by the fossil alkali and fixed air, and dissolved them in water sufficient to make a small loaf of bread. To this I added a little of the marine acid, commonly called spirit of sea-salt; fixed air was generated, but was absorbed by the cold-water; it was then mixed with flour, set in a warm place to rise, and shortly after baked; and I had the exquisite pleasure to obtain a tolerably light loaf of bread, such as any one would have supposed to have been fermented, which was seasoned by the sea-salt, formed by the union of the fossil alkali and spirit of sea-salt; whilst the fixed air of the fossil alkali was disengaged, in order to raise it."

9
Other facts
in confir-
mation of
his opinion.

To these instances mentioned by our author we shall add two others, which show that fixed air is not even necessary to the raising of bread; and of consequence we cannot suppose that fermentation, which produces a great quantity of it, is the foundation of the process. One is, that eggs, when beaten into a froth, are sometimes made use of for raising bread; but more especially for puddings, &c. in which they perform an

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operation similar to that of raising and rendering bread light and spongy. This is done by the rarefaction of the particles of air enveloped among the glutinous particles of the egg: and hence snow, on account of its porous and spongy nature, containing a great quantity of air enveloped amongst its particles, will do the same thing. This last particular was lately published by Dr Rotheram of Newcastle.

With regard to the other experiments of Mr Henry, they seem to Dr Pennington not to be altogether conclusive. He doubts the justice of Mr Henry's idea, "that wort cannot be brought into the vinous fermentation without the addition of a ferment." When we consider the analogy betwixt the infusion of malt and other fermentable liquids, the Doctor supposes that wort, as well as they, might spontaneously fall into a state of fermentation. He says indeed, that he has not as yet been able to disprove the idea by experiment: but Captain Cook has already made the experiment, and the event has decided the matter in the Doctor's favour*. We are told by that celebrated navigator, that the inspissated wort would have answered the purpose excellently, provided it could have been kept from fermentation in its inspissated state. But this was found impossible: of consequence we must conclude, that wort, as well as other liquors, will fall into a state of fermentation spontaneously, though perhaps not so readily, or with such a small degree of heat, as other fermentable liquors. Hence we are not altogether certain, as Dr Pennington hints, whether the fermentation in Mr Henry's experiments might not have taken place without it. "In the memoir (Mr Henry's) above mentioned, says the Doctor, the author seems to think, that *fixed air* is the true cause of fermentation in vinous liquors; and he tells us of the excellent taste afforded to punch by being impregnated with it. Fixed air, it is well known, improves the *taste* of liquors; but we cannot suspect that it made the punch ferment in his experiment: but he tells us, that he made an artificial yeast; that with this yeast he made beer (perhaps he might have made it without it) and vinegar; and that he fermented bread with it. As for its fermenting bread, we might readily allow that it would raise bread, upon the principles already laid down: and when he tells us how quick the fermentation takes place in his liquors when exposed to a gentle heat, may we not justly suppose, that the warmth extricated the fixed air that he had artificially combined with it, and that from this phenomenon alone he had supposed fermentation to be going on in them? Fixed air is the cause of the briskness, pungent taste, and sparkling appearance, of vinous liquors; and it is remarkable, that, in equal circumstances, the colder they are, the more air they contain. It is also a curious fact, that the fixed air in liquors must be in a peculiar state, otherwise they do not possess that briskness or pungency we spoke of; in fact, it must be on the point of assuming its elastic form: hence liquors are not so brisk in cold as in warm weather; and a connoisseur in porter, for instance, will tell you, that a bottle shall open very briskly in a warm day; and upon the coming on of cold weather, all the rest shall be flat and dead; but let them be corked up and kept in a warm room for a few days, they will all recover their former briskness; nay, I

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article Cook,
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394. col. 2.

Fermenta-
tion.II
His theory
of fermenta-
tion.12
General re-
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have seen a bottle opened in a cold day, that has been quite vapid, which was made brisk and lively by corking it up tight again, and setting it for ten or twelve minutes in a basin of water a little more than milk warm."

Our author's theory of fermentation is to the following purpose. 1. The heat occurring in the mixture, he explains on Dr Black's principle of latent heat. 2. In the fermenting process, he supposes the inflammable part of the mixture to have a tendency to combine with pure air, and thus to form what is called *fixed air*. 3. The pure air is supposed to be derived from the atmosphere, while inflammable air is furnished by the fermenting liquor. 4. The fixed air found in such plenty above the liquid while in a state of fermentation, does not exist in it originally, but is formed by a combination of the two ingredients just mentioned. 5. On these principles the heat which takes place in the mixture may be particularly explained in the following manner. "Suppose that the quantity of heat in the two airs before combination was in each as *ten*; or, in other words, that they were capable of containing that quantity in a latent state essential to their existence as matter in that form; when they unite, they form a very different kind of air, which is not capable of combining with so much heat, and perhaps quite foreign to its existence as that kind of matter: we will suppose then, that it can combine with but a quantity of that heat as *five*; the consequence must then be, that there is a quantity of redundant heat, as *fifteen*; and there being no bodies at hand undergoing any changes in their properties, by which their capacities to unite with heat as a principle are increased, it becomes *mechanically diffused* among those bodies which are nearest to it; it gives the redundant heat to the hand," &c.

We shall conclude this article with one obvious remark, viz. that the dispute concerning Mr Henry's method of inducing fermentation, may be easily decided by a comparative trial. Let, for instance, two gallons of wort, the quantity he used in his experiment, be put into a certain vessel without addition, and kept in a moderate heat for a certain time; take other two gallons, and impregnate the whole or any part of it with fixed air, according to Mr Henry's method: put the whole then into a vessel similar to the other, and set it in the same place; and if the fermentation begins in the one impregnated with fixed air sooner than the other, we have good reason to believe that the fixed air was the cause of its doing so. This experiment is easily made, and must be of considerable importance to the public: for, as Mr Henry justly observes, his experiments "may be of extensive utility, and contribute to the accommodation, the pleasure, and the health, of men in various situations, who have hitherto been precluded in a great measure from the use of fermented liquors; and be the means of furnishing important articles of diet and of medicine." Even as matters stand, we must consider this end as accomplished; though, if the mere circumstance of heat, without fixed air, would bring on fermentation, it would undoubtedly render the process considerably easier, by saving the trouble of impregnating the liquor with fixed air. With regard to bread, his method seems to be entirely decisive.

The business of fermentation is one of the great preparations to the distillery. What we usually call vinous fermentation in particular, is the kind in which it is principally concerned. By this we usually understand that physical action, or intestine commotion of the parts of a vegetable juice, tincture, or solution, which render them fit to yield an inflammable spirit on distillation.

This fermentation in the hands of the distiller differs from the common one that is used in the making of potable vinous liquors, as being much more violent, tumultuary, active, and combinatory than that. A large quantity of yeast, or other ferment, is added to the distiller's fermentation; the free air is admitted, and every thing is contrived to quicken the operation, so that it is sometimes finished in two or three days. This great dispatch, however necessary to the large dealer, has its inconveniences attending it; for the spirit is by this means always fouler, more gross, and really terrestrial, than it would have been if the liquor had undergone a proper fermentation in a slower manner. It also suffers a diminution in its quantity, from the violent and tumultuary admission, conflict, and agitation of the free air, both in the body and upon the surface of the liquor, especially if the liquor be not immediately committed to the still as soon as the fermentation is fairly slackened or fully ended. It is a very difficult task to render the business of fermentation at once perfect and advantageous. To ferment, in perfection, necessarily requires length of time and careful attendance, and close vessels, beside several other articles of nice management, which cannot be expected to be received and practised in the large way, on account of the trouble and expence, unless it could be proved to the distillers, as possibly it sometime may, that the quantity of spirit would be so much greater from the same quantity of materials managed thus, than by the common way, that it will more than pay its own expence: to which may be added, the very well known advantage of the spirit thus procured by perfect fermentation, being much finer than that obtained in the common way. Till this shall be made out, it may not be amiss to try how much of the more perfect art of vinous fermentation is profitably practicable by the distiller in the present circumstances of things. The improvements to be made in this affair will principally regard, 1. The preparation or previous disposition of the fermentable liquor. 2. The additions tending to the general or some particular end. 3. The admission or exclusion of the air. 4. The regulation of the external heat or cold. And, 5. A suitable degree of rest at last. When proper regard is had to these particulars, the liquor will have its due course of fermentation, and it will thence become fit to yield a pure and copious inflammable spirit by distillation. The tincture, solution, or liquor, intended for fermentation, for the still, should be considerably thin and aqueous. That sort of richness there is in the twelve-shilling small beer, is the utmost that ought to be allowed to it. This property not only fits it to ferment readily, but also to yield a larger quantity in proportion of a pure vinous spirit, than it would do if it were more rich or clammy: the gross, foul, viscid, and earthy particles of such glutinous liquors, being after fermentation apt to rise up with the boiling heat which

Fermenta-
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Fermentation. which must necessarily be employed to raise the spirit; and the spirit thus of course comes over foul and fetid. There is also another advantage attending the thinness of this liquor, which is, that it will sooner become fine by standing before fermentation; whence it may be commodiously drawn off from its feces or bottom, which must always, in case of corn, malt, or any other meally substance, be kept out where the purity of the spirit is consulted. A certain degree of warmth seems necessary in all the northern climates, to all sorts of artificial liquors intended for immediate fermentation, especially in winter; but the natural juices of vegetables, which have never been inspissated, as that of grapes and other fruits when fully ripened, will usually ferment, as soon as they are expressed, without any external assistance. But as a certain degree of inspissation prevents all tendency to fermentation in all vegetable juices, though otherwise strongly disposed to ferment; so a long continuance, or an increase of the inspissating heat, especially if it acts immediately thro' a metalline or solid body upon the juice, will destroy its fermenting property; and it will do this the more effectually, as the heat employed approaches to that of scorching, or the degree capable of giving an empyreuma. — After the same manner, several experiments make it appear that there is a certain degree of heat, the continuance or least increase of which proves detrimental or destructive to fermentation, as there is another which in a wonderful manner encourages and promotes it. These two degrees of heat ought to be carefully noted and settled by the thermometer, or other certain methods, for philosophical and chemical uses; but for common, or all economical occasions, they may be limited to what we call a tepid and fervid heat. A fervid heat is the bane of all vinous fermentation; as a tepid one, or rather imperceptible warmth, is the great promoter of them. In this neutral state, therefore, with proper contrivances to preserve and continue it, the liquor is to be put into a suitable vessel for fermentation; at which time, if it works not of itself, it must be quickened by additions; and, in general, by such things as are commonly called *ferments*.

The juices of plants are strangely altered by fermentation; and are susceptible of many, and those very various, changes from it. And it is not only the juices of fruits that are thus to be wrought upon, as those of apples, pears, grapes, and the like, in the common way; but there is an artificial change to be made in the seeds of plants by what is called *malting*. And it is not grain alone that is thus to be wrought upon, but any other seed whatever may be made to yield its juices and virtues freely to water by this process. The juices of roots also, for instance that of liquorice, will be wrought upon in the same manner; and the juices of the bodies of trees, as of the birch, and the like. If in the month of March a hole be bored into the body of a birch-tree, and this hole be stopped with a cork, through the middle of which there is thrust a quill open at both ends, the juices of the tree will drop out at the quill at the rate of a large drop every second of a minute, and a great quantity will in time be obtained in this manner. This liquor is not unpleasant to the taste, and looks tolerably clear, resembling water into which a little milk had been spilt. There are many ways of fermenting this juice, by all of which it is converted into a sort

of wine. These are well known. But there is another remarkable property in our maples, both the common small kind and the great one, which we call the *sycamore*: these being tapped in the same manner, will bleed freely in winter; and their juices, after a hard frost breaks, will flow out in so copious a manner as is scarce to be conceived. The willow, the poplar, and the walnut-tree, will all bleed also; and fermentation, of which their several juices are easily susceptible, will turn them all into palatable and strong wines.

FERN, *FILIX*, in botany. See *FILICES*.

Fern is very common in dry and barren places. It is one of the worst weeds for lands, and very hard to destroy where it has any thing of a deep soil to root in. In some grounds, the roots of it are found to the depth of eight feet. One of the most effectual ways to destroy it is often mowing the grass; and, if the field is ploughed up, plentiful dunging thereof is very good: but the most certain remedy for it is urine. However, fern, cut while the sap is in it, and left to rot upon the ground, is a very great improver of land.

In some places of the north, the inhabitants mow it green; and, burning it to ashes, make those ashes up into balls with a little water. They then dry them in the sun, and make use of them to clean their linen with; looking upon it to be near as good as soap for that purpose.

Male FERN. See *POLYPODIUM*.

Female FERN. See *PTERIS*.

FERNANDO, or FERNANDES, an island in the Pacific ocean. See *JUAN Fernandes*.

FERNELIUS (John), physician to Henry II. king of France, was born in Picardy, in the latter end of the 15th or the beginning of the 16th century. Being sent to Paris to study rhetoric and philosophy, he applied himself in a most intense manner. All other pleasure was insipid to him. He cared neither for play nor for walking, nor for entertainments, nor even for conversation. He read Cicero, Plato, and Aristotle. The reading of Cicero procured him this advantage, that the lectures he read on philosophical subjects were as eloquent as those of the other masters were barbarous at that time. He also applied himself very earnestly to the mathematics. This continual study drew upon him a long fit of sickness, which obliged him to leave Paris. On his recovery, he returned thither with a design to study physic; but before he applied himself entirely to it, he taught philosophy in the college of St Barbara. After this he spent four years in the study of physic; and taking a doctor's degree, confined himself to his closet, in order to read the best authors, and to improve himself in the mathematics; that is, as far as the business of his profession would suffer him. Never was a man more diligent than Fernel. He used to rise at four o'clock in the morning, and studied till it was time either to read lectures or to visit patients. He then examined the urine that was brought him; for this was the method of those times, with regard to the poor people, who did not send for the physician. Coming home to dine, he shut himself up among his books till they called him down to table. Rising from table, he returned to his study, which he did not leave without necessary occasions. Coming home at night, he did just as at noon: he staid among his books till they called him to supper; returned

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turned to them the moment he had supped; and did not leave them till eleven o'clock, when he went to bed. In the course of these studies, he contrived mathematical instruments, and was at great charges in making them. But his wife murmuring at the expence, he dismissed his instrument-makers, and applied himself in good earnest to practise physic. But as visiting patients did not employ his whole time, he read public lectures upon Hippocrates and Galen. This soon gained him a great reputation through France and in foreign countries. His business increasing, he left off reading lectures; but as nothing could make him cease to study in private, he spent all the hours he could spare in composing a work of physic, intitled *Physiologia*, which was soon after published. He was prevailed with to read lectures upon this new work, which he did for three years: and undertaking another work, which he published, *De vena sectione*, he laid himself under a necessity of reading lectures some years longer, in order to explain this new book to the youth. While he was thus employed, he was sent for to court, in order to try whether he could cure a lady, whose recovery was despaired of. He was so happy as to cure her; which was the first cause of that esteem which Henry II. who was then but dauphin, and was in love with that lady, conceived for him. This prince offered him, even then, the place of first physician to him; but Fernel, who infinitely preferred his studies to the hurry of a court, would not accept the employment. When Henry came to the throne, he renewed his intreaties: but Fernel represented, that the honour which was offered to him was due, for several reasons, and as an hereditary right, to the late king's physician; and that, as for himself, he wanted some time to make experiments concerning several discoveries he had made relating to physic. The king admitted this: but as soon as Francis I.'s physician died, Fernel was obliged to go and fill his place at Henry II.'s court. And here just the contrary to what he dreaded came to pass; for he enjoyed more rest and more leisure at court than he had done at Paris; and he might have considered the court as an agreeable retirement, had it not been for the journeys which the new civil war obliged the king to take. He died in 1558, leaving behind him a great many works, besides what have been mentioned; as, *De abditis rerum causis*, seven books of Pathology, a book on Remedies, &c. They have been printed several times; with his life prefixed, written by William Plantius his disciple.

FERONIA, the pagan goddess of woods and orchards. This deity took her name from the town Feronia, situated at the foot of mount Soracte in Italy, where was a wood and temple consecrated to her. That town and wood are mentioned by Virgil, in the catalogue of Turnus's forces. Strabo relates, that those who sacrificed to this goddess, walked barefoot upon burning coals, without being hurt. She was the guardian deity of freed-men, who received their cap of liberty in her temple.

FERRARA, a city of Italy, in the territory of the pope, capital of a duchy of the same name. It is seated in an agreeable and fertile plain; watered by the river Po, which is a defence on one side; and on the other is encompassed by a strong wall and deep broad ditches full of water, as well as by a good citadel, finished by

pope Paul. In the middle of the city is a magnificent castle, which was formerly the palace of the dukes, and is not now the least ornament of Ferrara. It is quite surrounded with water; and the arsenal, which is near it, deserves the observation of travellers. Over-against the palace is the duke's garden; with a park, called *Belvidere* on account of its beauty. Behind the garden there is a palace, built with white marble, called the *palace of diamonds*, because all the stones are cut diamond fashion.

Ferrara had formerly a considerable trade; but it is now almost deserted, being very poor, inasmuch that there is hardly a person to be seen in the streets. This is owing to the exactions of the popes. The fortifications are now neglected, and the ancient university is dwindled into a wretched college of the Jesuits. However, in 1735, it was advanced to an archbishopric by pope Clement XII. The country about it is so marshy, that a shower or two of rain renders the roads almost impassable. It is 24 miles north-east of Bologna, 38 north-west of Ravenna, 70 north-by-west of Florence, and 190 north of Rome. E. Long. 12. 14. N. Lat. 44. 36.

FERRARA, the duchy of; a province in the pope's territory, bounded on the north by the state of Venice, on the west by the duchies of Mantua and Mirandola, on the south by the Boulognese and by Romania, of which it was formerly a part, and on the east by the Gulph of Venice. It is 50 miles in length, and 43 in breadth along the coast; but grows narrower and narrower towards the Mantuan. This country is almost surrounded by the branches of the Po, which often overflow the country, and form the great morafs of Comachio, which has a bad effect on the air. It is thin of people, and indifferently cultivated, though fit for corn, pulse, and hemp. The Po and the lake of Comachio yield a large quantity of fish. Ferrara is the capital town; besides which there are Arano, Comachio, Magnavacca, Belriguardo, Cento, Buendeno, and Ficherola. This duchy was formerly possessed by the house of Este. But the pope took possession of it in 1598, after the death of Alphonso II. duke of Ferrara, it being a fief of the church.

FERRARIA, in botany: A genus of the triandria order, belonging to the gynandria class of plants; and in the natural method ranking under the sixth order, *Ensatæ*. The spathe are unisporous; the petals six in number, and wavily curled; the stigmata cucullated or cowed; the capsule is trilocular, inferior. There are two species, natives of the Cape of Good Hope. There is a great singularity in the root of one of these species, that it vegetates only every other year, and sometimes every third year; in the intermediate time it remains inactive, though very sound and good.

FERRARS (George), a lawyer, poet, historian, and accomplished gentleman, was descended from an ancient family in Hertfordshire, and born about the year 1510, in a village near St Alban's. He was educated at Oxford, and thence removed to Lincoln's inn; where applying with uncommon diligence to the study of the law, he was soon distinguished for his elocution at the bar. Cromwell earl of Essex, the great minister of Henry VIII. introduced him to the king, who employed him as his menial servant, and, in 1535, gave him

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him a grant of the manor of Flamstead in his native county. This is supposed to have been a profitable estate; nevertheless, Mr Ferrars being a gay courtier, and probably an expensive man, about seven years after was taken to execution by a sheriff's officer for a debt of 200 merks, and lodged in the compter. Being at this time member for Plymouth, the house of commons immediately interfered, and he soon obtained his liberty. He continued in favour with the king to the end of his reign, and in that of Edward VI. he attended the lord protector Somerset as a commissioner of the army in his expedition to Scotland in 1548. In the same reign, the young king being then at Greenwich, Mr Ferrars was proclaimed *lord of misrule*, that is, prince of sports and pastimes; which office he discharged during 12 days, in Christmas holidays, to the entire satisfaction of the court. This is all we know of Mr Ferrars; except that he died in 1579, at Flamstead in Hertfordshire, and was buried in the parish-church. He is not less celebrated for his valour in the field, than for his other accomplishments as a gentleman and a scholar. He wrote, 1. *History of the Reign of Queen Mary*; published in Grafton's chronicle, 1569, fol. 2. Six tragedies, or dramatic poems; published in a book called the *Mirror for Magistrates*, first printed in 1559, afterwards in 1587, and again in 1610.

FERRARS (Henry), a Warwickshire gentleman of a good family, was eminent in antiquities, genealogies, and heraldry. Mr Wood says, that out of the collections of this gentleman, Sir William Dugdale laid part of the foundation of his celebrated *Antiquities of Warwickshire*. Camden also makes honourable mention of his assistance in relation to Coventry. Some scattered poems of his were published among others in the reign of queen Elizabeth; and he died in 1633.

FERRET, in zoology. See MUSTELA.

FERRERS, among glass-makers, the iron with which the workmen try the melted metal, to see if it be fit to work.—It is also used for those irons which make the rings at the mouth of the bottles.

FERRETTO, in glass making, a substance which serves to colour glass.

This is made by a simple calcination of copper, but it serves for several colours: there are two ways of making it. The first is this. Take thin plates of copper, and lay them on a layer of powdered brimstone, in the bottom of a crucible; over these lay more brimstone, and over that another layer of the plates, and so on alternately till the pot is full. Cover the pot, lute it well, place it in a wind-furnace, and make a strong fire about it for two hours. When it is taken out and cooled, the copper will be found so calcined, that it may be crumbled to pieces between the fingers like a friable earth. It will be of a reddish, and, in some parts, of a blackish colour. This must be powdered and sifted fine for use.

Another way of making ferretto is as follows: Make a number of stratifications of plates of copper and white vitriol alternately in a crucible; which place on the floor of the glass furnace near the eye; and let it stand there three days; then take it out, and make a new stratification with more fresh vitriol; calcine again as before. Repeat this operation six times, and a most valuable ferretto will be obtained

FERRI (Ciro), a skilful painter, born of a good family at Rome, in 1634. He was bred under Peter Cortona; and the works of the scholar are often mistaken for those of the master. The great duke of Tuscany nominated him chief of the Florentine school; and he was as good an architect as a painter. He died in 1689.

FERRO, (W. Long. 19. N. Lat. 28), the most westerly of the Canary islands, near the African coast, where the first meridian was lately fixed in most maps; but now, the geographers of almost every kingdom make their respective capitals the first meridian, as we do London. It is a dry and barren spot, affording no water except what is supplied in a very surprising manner by a tree which grows in these islands. See FOUNTAIN-Tree.

FERRO; Faro, or Feroe Islands; a cluster of little islands lying in the Northern ocean, between 61° and 63° N. Lat. and between 5° and 8° W. Long. They belong to Denmark. There are 17 which are habitable; each of which is a lofty mountain arising out of the waves, divided from the others by deep and rapid currents. Some of them are deeply indented with secure harbours; Providence seeming to have favoured mankind with the safest retreats in the most boisterous seas. All are very steep, and most of them faced with most tremendous precipices. The surface of the mountains consists of a shallow soil of remarkable fertility; for barley, the only corn sown here, yields above 20 for one; and the grafs affords abundant pasturage for sheep. The exports are, salted mutton and tallow, goose-quills, feathers, and eider-down; and, by the industry of the inhabitants, knit woollen waistcoats, caps, and stockings. No trees beyond the size of juniper or stunted willows will grow here; nor are any wild quadrupeds to be met with except rats and mice, originally escaped from the shipping. Vast quantities of sea-fowl frequent the rocks; and the taking of them furnishes a very perilous employment to the natives, as described under the article *BIRD-Catching*.

The sea which surrounds these islands is extremely turbulent. The tides vary greatly on the western and eastern sides. On the first, where is received the uninterrupted flood of the ocean from the remote Greenland, the tide rises seven fathoms; on the eastern side it rises only three. Dreadful whirlwinds, called by the Danes *oes*, agitate the sea to a strange degree; catch up a vast quantity of water, so as to leave a great temporary chasm in the spot on which it falls, and carries away with it, to an amazing distance, any fishes which may happen to be within reach of its fury. Thus great shoals of herrings have been found on the highest mountains of Feroe. It is equally rifleless on land; tearing up trees, stones, and animals, and carrying them to very distant places.

Among the numerous whirlpools of these seas, that of Suderoe, near the island of the same name, is the most noted. It is occasioned by a crater 61 fathoms in depth in the centre, and from 50 to 55 on the sides. The water forms four fierce circumgyrations. The point they begin at is on the side of a large basin, where commences a range of rocks running spirally, and terminating at the verge of the crater. This range is extremely rugged, and covered with water from the depth of 12 to 8 fathoms only. It forms four equi-

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distant wreaths, with a channel from 35 to 20 fathoms in depth between each. On the outside, beyond that depth, the sea suddenly sinks to 80 and 90. On the south border of the basin is a lofty rock, called *Sumboe Munk*, noted for the multitude of birds which frequent it. On one side, the water is only 3 or 4 fathoms deep; on the other 15. The danger at most times, especially in storms, is very great. Ships are irresistibly drawn in; the rudder loses its power; and the waves beat as high as the masts; so that an escape is almost miraculous: yet at the reflux, and in very still weather, the inhabitants will venture in boats for the sake of fishing.

FERROL, a sea-port town of Spain, in the province of Galicia, seated on a bay of the Atlantic ocean. It has a good harbour, and is frequented by the Spanish fleet in time of war. W. Long. 8. 46. N. Lat. 43. 26.

FERRUGINOUS, any thing partaking of iron, or which contains particles of that metal.

FERRUGO, RUST. See **RUST**.

FERRUM, IRON. See **IRON**.

FERRY, a liberty by prescription, or by the king's grant, to have a boat for passage, on a frith or river, for carrying passengers, horses, &c. over the same for a reasonable toll.

FERTILITY, that quality which denominates a thing fruitful or prolific.

Nothing can produce fertility in either sex, but what promotes perfect health: nothing but good blood, spirits, and perfect animal functions, that is, high health, can beget perfect fecundity; and therefore, all means and medicines, all nostrums and specifics, to procure fertility, different from those which procure good blood and spirits, are arrant quackery. Dr Cheyne says, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent infertility, and bring fine children, it is a milk and seed diet persevered in by both parents.

To increase the fertility of *vegetables*, says lord Bacon, we must not only increase the vigour of the earth and of the plant, but also preserve what would otherwise be lost: whence he infers, that there is much saved by setting, in comparison of sowing. It is reported, continues he, that if nitre be mixed with water to the thickness of honey, and after a vine is cut, the bud be anointed therewith, it will sprout within eight days. If the experiment be true, the cause may be in the opening of the bud, and contiguous parts, by the spirit of the nitre; for nitre is the life of vegetables.

How far this may be true, is not perhaps sufficiently shown, notwithstanding the experiments of Sir Kenelm Digby and M. Homberg. Consult Mr Evelyn's *Sylva*, the *Philosophical Transactions*, the *French Memoirs*, and Dr Stahl's *Philosophical Principles of Chemistry*; but a proper set of accurate experiments seems still wanting in this view.

FERULA, a little wooden pallet or slice, reputed the schoolmaster's sceptre, wherewith he chastises the boys, by striking them on the palm of the hand. The word is Latin, and has also been used to denote the prelate's crosier and staff. It is supposed to be formed of the Latin, *ferire*, "to strike." Under the eastern empire, the ferula was the emperor's sceptre, as is seen

on divers medals; it consists of a long stem or shank, and a flat square head. The use of the ferula is very ancient among the Greeks, who used to call their princes *ναρθηκαροποι*, q. d. "ferula-bearers."

In the ancient eastern church, ferula or *narthex* signified a place separated from the church; wherein the penitents or the catechumens of the second order, called *auscultantes*, *ακροαματικοι*, were kept, as not being allowed to enter the church; whence the name of the place, the persons therein being under penance or discipline: *sub ferula erant ecclesia*.

FERULA, *Fennel-giant*, in botany: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellata*. The fruit is oval, compressed plane, with three striæ on each side. There are nine species; all of them herbaceous perennials, rising from three to ten or twelve feet high, with yellow flowers. They are propagated by seeds, which should be sown in autumn; and, when planted out, ought to be four or five feet distant from each other, or from any other plants; for no other will thrive under their shade. The drug *assaetida* is obtained from a species of ferula; though not peculiarly, being also produced by some other plants.

FESCENNIA, or **FESCENNIVM**, (anc. geog.), a town of Etruria, above Falerii; where the Fescennine verses were first invented. Now *Galese*, in the Ecclesiastical State, near the Tiber.

FESCENNINE VERSES, in antiquity, were a kind of satirical verses, full of wanton and obscene expressions, sung or rehearsed by the company, with many indecent gestures and dances, at the solemnization of a marriage among the Romans; (*Hor. ep. i. lib. v. 145.*) The word is borrowed, according to Macrobius, from *fascinum*, "a charm;" the people taking such songs to be proper to drive away witches, or prevent their effect; but its more probable origin is from Fescennium, a city of Campania, where such verses were first used.

FESSE, in heraldry, one of the nine honourable ordinaries. See **HERALDRY**.

FESSE-POINT, is the exact centre of the escutcheon. See **POINT**.

FESSE-WAYS, or in **FESSE**, denotes any thing borne after the manner of a fesse; that is, in a rank across the middle of the shield.

Party per FESSE, implies a parting across the middle of the shield, from side to side, through the fesse point.

FESTI DIES, in Roman antiquity, certain days in the year, devoted to the honour of the gods.

Numa, when he distributed the year into 12 months, divided the same into the *dies festi*, *dies profesti*, and *dies intercisi*.

The festi were again divided into days of sacrifices, banquets, games, and feriae. See **FERIAE**.

The *profesti* were those days allowed to men for the administration of their affairs, whether of a public or private nature: these were divided into fasti, comitiales, &c. See **FASTI**, **COMITIALES**, &c.

The *intercisi* were days common both to gods and men, some parts of which were allotted to the service of the one, and some to that of the other.

FESTINO, in logic, the third mood of the second figure of the syllogism, the first proposition whereof is

Ferula
||
Festino.

Festival
||
Fetus.

an universal negative, the second a particular affirmative, and the third a particular negative; as in the following example:

FES No bad man can be happy.

TI Some rich men are bad men.

NO *Ergo*, some rich men are not happy.

FESTIVAL, a time of feasting: See FEAST.—The term is particularly applied to anniversary days of civil or religious joy.

FESTOON, in architecture and sculpture, &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twisted together.

It is in the form of a string or collar, somewhat biggest in the middle, where it falls down in an arch; being extended by the two ends, the extremities of which hang down perpendicularly.

Festoons are now chiefly used in friezes, and other vacant places which want to be filled up and adorned; being done in imitation of the long clusters of flowers, which the ancients placed on the doors of their temples and houses on festival occasions.

FESTUCA, FESCUE, in botany: A genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the 34th order, *Gramina*. The calyx is bivalved; and the spicula or partial spike is oblong and a little roundish, with the glumes acuminate. There are 16 species; two of which, as being the most remarkably useful, are described under the article AGRICULTURE, n° 53—58. Another species, called the *fluitans*, or *floating fescue*, from its growing in wet ditches and ponds, is remarkable for the uses that are made of its seeds. These seeds are small, but very sweet and nourishing. They are collected in several parts of Germany and Poland, under the name of *manna feeds*; and are used at the tables of the great, in soups and gruels, on account of their nutritious quality and grateful flavour. When ground to meal, they make bread very little inferior to that in common use. The bran, separated in preparing the meal, is given to horses that have worms; but they must be kept from water for some hours afterwards. Geese are also very fond of these seeds.—Mr Lightfoot recommends this as a proper grass to be sown in wet meadows.

FESTUS (Pompeius), a celebrated grammarian of antiquity, who abridged a work of Verrius Flaccus, *De Significatione Verborum*; but took such liberties in castration and criticising, as, Gerard Vossius observes, are not favourable to the reputation of his author. A complete edition of his fragments was published by M. Dacier in 1681, for the use of the Dauphin. Scaliger says, that Festus is an author of great use to those who would attain the Latin tongue with accuracy.

FETLOCK, in the manege, a tuft of hair growing behind the pastern joint of many horses; for those of a low size have scarce any such tuft.

FETTI (Domenico), an eminent painter in the style of Julio Romano, was born at Rome in 1589, and educated under Ludovico Civali of Florence. He painted but little for churches, but excelled in history; his pictures are much sought after, and are scarce. He abandoned himself to disorderly courses; and put an end to his life, by excesses, in the 35th year of his age.

FETUS. See FOETUS.

FEUD, in our ancient customs, is used for a capital quarrel or enmity, not to be satisfied but with the death of the enemy; and thence usually called *deadly feud*.—*Feud*, called also *feida*, and *faida*, in the original German signifies *guerram*, i. e. *bellum*, "war." Lambert writes it *feeth*, and saith it signifies *capitales inimicitias*, or "implacable hatred."

In Scotland, and the north of England, feud is particularly used for a combination of kindred, to revenge the death of any of their blood, against the killer and all his race, or any other great enemy.

FEUD (*Feoda*), the same with *Fief*, or *Fee*. See FEODAL System.

FEUDAL, or FEODAL, of or belonging to a feud or fee. See FEODAL.

FEUDATORY, or FEODATORY, a tenant who formerly held his estate by feudal service. See FEODAL TENURE.

FEU-DUTY, in Scots law, is the annual rent or duty which a vassal, by the tenor of his right, becomes bound to pay to his superior.

FEU-Holding, in Scots law, is that particular tenure by which a vassal is taken bound to pay an annual rent or feu-duty to his superior.

FEVER. See (*Index* subjoined to) MEDICINE.

The ancients deified the diseases as well as the passions and affections of men. Virgil places them in the entrance into hell, *Æn.* vi. 273. Among these, *Fever* had a temple on mount Palatine, and two other parts of ancient Rome; and there is still extant an inscription to this goddess. FEBRI. DIVÆ. FEBRI. SANCTÆ. FEBRI. MAGNÆ, CAMILLA. AMATA. PRO. FILIO. MALE. AF-FECTO.

FEVER, in farriery. See there, sect. viii.

FEVERFEW, in botany. See MATRICARIA.

FEVERSHAM, a town of the county of Kent in England, situated on a branch of the river Thames, which is navigable for hoys. It was a royal demesne A. D. 811, and called in Kenulf's charter the *King's little Town*, though it is now a large one. It was inhabited by the Britons long before the invasion of Cæsar. In 903, king Athelstan held a great council here. King Stephen erected a stately abbey, 1147, whose abbots sat in parliament; and he was buried in it, together with Maud his queen, and Eustace his son; but of this building two mean gate-houses are all that now remain. The town was first incorporated by the name of the Barons of Feversham, afterwards by Henry VIII. with the title of the mayor and commonalty, and lastly by that of the mayor and jurats and commonalty. It is a populous flourishing place, consisting chiefly of two long broad streets, with a market-house in the centre, built 1574. Its ancient church was rebuilt in 1754, at the expence of 2300l. but was originally built in Edward II.'s reign. There is a free grammar-school in the place, built and endowed by Queen Elizabeth in 1582; also two charity-schools. It is a member of the cinque-port of Dover, and has a manufactory of gunpowder. The London markets are supplied from hence with abundance of apples and cherries, and the best oysters for stewing. These last are also fetched away in such quantities by the Dutch, that a prodigious number of men and boats are employed here in the winter to dredge for them; and

Feud
||
Feversham.

Feuillea
||
Fez.

and it is said they carry home as many as amount to above 2000 l. a-year. The fishermen will admit none to take up their freedom but married men.

FEVILLEA, in botany: A genus of the pentandria order, belonging to the diœcia class of plants; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. The male calyx is quinquefid; the corolla the same; there are five stamina; and the nectarium consists of five filaments connivent or closing together. The female calyx is quinquefid; the styles are three; and the fruit is an hard trilocular apple with an hard bark.

FEVRE (Tanegui le), of Caen in Normandy, born 1615, was an excellent scholar in the Greek and Roman learning. Cardinal de Richelieu gave him a pension of 2000 livres to inspect all the works published at the Louvre, and designed to have made him principal of a college he was about to erect at Richelieu. But the cardinal's death cut off his hopes; and Cardinal Mazarine having no great relish for learning, his pension was ill-paid. Some time after, the Marquis de Franciere, governor of Langres, took him along with him to his government, and there he embraced the Protestant religion; after which he was invited to Saumur, where he was chosen Greek professor. He there taught with extraordinary reputation. Young men were sent to him from all the provinces in the kingdom, and even from foreign countries, while divines and professors themselves gloried in attending his lectures. He was preparing to go to Heidelberg, whither he was invited by the prince Palatine, when he died, aged 57. He wrote, 1. Notes on Anacreon, Lucretius, Longinus, Phædrus, Justin, Terence, Virgil, Horace, &c. 2. A short account of the lives of the Greek poets. 3. Two volumes of letters; and many other works.

FEVRE (Claud le), an eminent French painter, was born at Fountainbleau in 1633, and studied in the palace there, and then at Paris under Le Sueur and Le Brun; the latter of whom advised him to adhere to portraits, for which he had a particular talent, and in his style equalled the best masters of that country. He died in England in 1675, aged 42.

FEZ, the capital of a kingdom of the same name in Barbary, in Africa. It is described as a very large place, surrounded with high walls, within which there are hills and valleys, only the middle being level and flat. The river, which runs through the city, is divided into two streams, from which canals are cut into every part of the town; so that the mosques, colleges, palaces, and the houses of great men, are amply supplied with water. They have generally square marble basins in the middle of the court of their houses, which are supplied with water by marble pipes that pass through the walls. They constantly run over, and the stream returns back into the street, and so into the river. The houses are built with brick or stone; and are adorned on the outside with fine Mosaic work, or tiles like those of Holland. The wood-work and ceilings are carved, painted, and gilt. The roofs are flat; for they sleep on the tops of the houses in summer. Most of the houses are two stories high, and some three. There are piazzas and galleries running all round the court on the inside, so that you may go under cover from one apartment to another. The pillars are of brick, covered

Nº 126.

with glazed tiles, or of marble, with arches between. The timber-work is carved and painted with gay colours, and most of the rooms have marble cisterns of water. Some of the great men build towers over their houses several stories high, and spare no expence to render them beautiful; from hence they have a fine prospect all over the city.

There are in this city 700 mosques, great and small; 50 of which are magnificent, and supported with marble pillars, and other ornaments. The floors are covered with mats, as well as the walls to the height of a man. Every mosque has a tower or minaret, like those in Turkey; with a gallery on the top, from whence they call the people to prayers. The principal mosque is near a mile and a half in circumference. The middle building is 150 yards in length, and 80 in breadth, with a tower proportionably high. Round this to the east, west, and north, there are great colonades 30 or 40 yards long. There are 900 lamps lighted every night; and in the middle of the mosque are large branches, which are capable of holding 500 lamps each. Along the walls are seven pulpits, from which the doctors of the law teach the people. The business of the priest is only to read prayers, and distribute alms to the people; to support which, there are large revenues.

Besides the mosques, there are two colleges built in the Moorish manner, and adorned with marble and paintings. In one of them there are 100 rooms, besides a magnificent hall. In this there is a great marble vase full of water, adorned with marble pillars of various colours, and finely polished. The capitals are gilt, and the roof shines with gold, azure, and purple. The walls are adorned with Arabic verses in gold characters. The other colleges are not near so beautiful, or rather all are gone to ruin since the neglect of learning.

There are hospitals in the city, where formerly all strangers were maintained three days *gratis*. But the estates belonging to them have been confiscated for the emperor's use. There are above 100 public baths, many of which are stately buildings. People of the same trade or business live in streets by themselves.

Though the country about Fez is pleasant and fertile, and in many places abounding with corn and cattle, yet a great part of it lies waste and uncultivated, not so much for want of inhabitants as from the oppression of the governors; which makes the people choose to live at some distance from the high roads, where they cultivate just as much land as is necessary for their own subsistence.

Round the city there are fine marble tombs, monuments, and gardens full of all manner of fruit-trees.

Such are the common accounts of this city. The following are given by M. Chenier in his *Recherches Historiques sur les Maures*.

Fez was built in the end of the eighth century by Edris, a descendant of Mahomet and of Ali; whose father, in order to avoid the proscriptions of the calif Abdallah, retired to the extremity of Africa, and was proclaimed sovereign by the Moors. Sidy Edris, having succeeded to the throne of his father, built the city of Fez in the year 793. He caused a mosque to be erected, in which his body was interred, and the city ever afterwards became an asylum for the Moors, and a place of devotion. In the first moments of fer-

vour

Fez.

Fez. your which a new worship inspires, another mosque was built called *Carubin*, which is perhaps one of the largest and most beautiful edifices in Africa. Several others were successively built, besides colleges and hospitals; and the city was held in such veneration, that when the pilgrimage to Mecca was interrupted in the fourth century of the Hegira, the western Mahometans substituted that of Fez in its stead, while the eastern people went to Jerusalem.

When the Arabs had overspread Asia, Africa, and Europe, they brought to Fez the little knowledge they had acquired in the sciences and arts; and that capital conjoined, with the schools of religion, academies where philosophy was taught, together with medicine and astronomy. This last gradually degenerated; ignorance brought astrology into repute, and this quickly engendered the arts of magic and divination.

Fez soon became the common resort of all Africa. The Mahometans went thither for the purposes of devotion; the affluence of strangers introduced a taste for pleasure; libertinism quickly followed; and, as its progress is most rapid in warm countries. Fez, which had been the nurse of sciences and arts, became a harbour for every kind of vice. The public baths, which health, cleanliness, and custom, had rendered necessary, and which were every where respected as sacred places, became scenes of debauchery; where men introduced themselves in the habit of women; youths, in the same disguise, with a distaff in their hands, walked the streets at sunset in order to entice strangers to their inns, which were less a place of repose than a convenience for prostitution.

The usurpers who disputed the kingdom of Fez after the 16th century overlooked these abuses, and contented themselves with subjecting the masters of the inns to furnish a certain number of cooks for the army. It is to this laxity of discipline that Fez owed its first splendour. As the inhabitants are beautiful, the Africans flocked thither in crowds; the laws were overturned, morals despised, and vice itself turned into an engine of political resource. The same spirit, the same inclinations, the same depravity, still exist in the hearts of all the Moors. But libertinism is not now encouraged: it wears there, as in other places, the mask of hypocrisy; and dares not venture to show itself in the face of day.

The Mahometans of Andalusia, those of Granada and Cordoua, migrated to Fez during the different revolutions that agitated Spain: they carried with them new customs and new arts, and perhaps some slight degree of civilization. The Spanish Moors carried from Cordoua to Fez the art of staining goat and sheep skins with a red colour, which were then called Cordoua leather, and now Morocco leather, from that city where the art is less perfect. They manufacture gauzes at Fez, silk stuffs, and girdles elegantly embroidered with gold and silk, which show how far their ingenuity might be carried if industry were more encouraged.

There is still some taste for study preserved at Fez, and the Arabic language is spoken there in greater purity than in any other part of the empire. The rich Moors send their children to the schools at Fez, where they are better instructed than they could be elsewhere.

Leo Africanus, in the 16th century, gave a magnificent description of this city, from which most of those

that have been afterwards made are copied: but its situation, its schools, and the industry and great urbanity of its inhabitants, are the only circumstances that give it any preference to the other cities of the empire. There are some pretty convenient inns here, consisting of two or three stories. The houses have no elegance externally: the streets are ill paved, and so strait that two persons riding abreast can hardly pass. The shops are like stalls; and have no more room in them than is sufficient to serve for the owner, who is always seated with his wares around him, which he shows to the passengers. But though the Moors of Fez are more civilized than the rest, they are vain, superstitious, and intolerant; and an order must be obtained from the emperor before a Christian or a Jew can be allowed to enter the city.

The situation of Fez is exceedingly singular. It lies in the bottom of a valley surrounded by little hills in the shape of a funnel; the declivities are divided into gardens planted with tall trees, orange shrubs, and all sorts of fruit-trees; a river meanders along the declivity, and turns a number of mills, which disperse the water abundantly to all the gardens, and almost to every house. The descent to the city, which stands in the centre, is long; and the road lies through these gardens, which it traverses, in a serpentine direction.

The gardens, seen from the city, form a most delightful amphitheatre. Formerly each garden had a house in which the inhabitants spent the summer. These houses were destroyed in the times of the civil wars, and in the revolutions to which Fez has been subject, and few individuals have restored them. The situation of Fez, however, cannot be healthful; moist vapours fill the air in summer, and fevers are exceedingly common.

On the height above Fez, in a plain susceptible of rich cultivation, stands New Fez, finely situated, and enjoying excellent air, containing some old palaces, in which the children of the emperor live, and where he sometimes resides himself. New Fez is inhabited by some Moorish families, but by a greater number of Jews.

Fez is seated on the river Cebu, W. Long. 4. 25. N. Lat. 33. 58.

FEWEL. See FUEL.

FIASCONI, a town of Italy in the territories of the pope, remarkable for its good wine. E. Long. 13. 12. N. Lat. 42. 20.

FIAT, in law, a short order or warrant signed by a judge, for making out and allowing certain processes.

FIBRARIE, a class of fossils, naturally and essentially simple, not inflammable nor soluble in water; and composed of parallel fibres, some shorter, others longer; their external appearance being bright, and in some degree transparent: add to this, that they never give fire with steel, nor ferment with or are soluble in acid menstrua.

FIBRE, in anatomy, a perfectly simple body, or at least as simple as any thing in the human structure; being fine and slender like a thread, and serving to form other parts. Hence some fibres are hard, as the bony ones; and others soft, as those destined for the formation of all the other parts.

The fibres are divided also, according to their situation, into such as are straight, oblique, transverse, annular,

Fez
||
Feze.

Fibre
||
Ficoides.

nular, and spiral; being found arranged in all these directions in different parts of the body.

FIBRE is also used to denote the slender FILAMENTS which compose other bodies, whether animal, vegetable, or mineral; but more especially the capillary roots of plants.

FIBROSE, or FIBROUS, something consisting of fibres, as the roots of plants. See ROOT.

FIBULA, in anatomy, the outer and slenderer of the two bones of the leg. See ANATOMY, n° 62.

FIBULA, in surgery, an instrument in use among the ancients for the closing of gaping wounds.—Celsus speaks of the fibula as to be used when the wound was so patent as not easily to admit of being sewed. (*Op. lib. vii. cap. 25. apud fin.*)

FIBULA, in antiquity, was a sort of button, buckle, or clasp, made use of by the Greeks and Romans for keeping close or tying up some part of their cloaths. They were of various forms, and often adorned with precious stones. Men and women wore them in their hair and at their shoes. Players and musicians, by way of preserving the voices of children put under their care to learn their arts, used to keep close the prepuce with a fibula, lest they should have commerce with women.

FICINUS (Marfilus), a celebrated Italian, was born at Florence in 1433, and educated at the expence of Laurence de Medicis. He attained a perfect knowledge of the Greek and Latin tongues, and became a great philosopher, a great physician, and a great divine. He was in the highest favour with Laurence and Cosmo de Medicis, who made him a canon of the cathedral church of Florence. He applied himself intently to the study of philosophy; and while others were striving who should be the deepest read in Aristotle, who was then the philosopher in fashion, he devoted himself wholly to Plato. He was indeed the first who restored the Platonic philosophy in the west; for the better effecting of which, he translated into Latin the whole works of Plato. There goes a story, but we know not how true it is, that when he had finished his translation, he communicated it to his friend Marcus Musurus, to have his approbation of it; but that, Musurus disliking it, he did it all over again. He next translated Plotinus; and afterwards the works, or part of them at least, of Proclus, Jamblicus, Porphyrius, and other celebrated Platonists.—In his younger years, Ficinus lived like a philosopher; and too much so, as is said, to the neglect of piety. However, Savanorola coming to Florence, Ficinus went with every body else to hear his sermons; and while he attended them for the sake of the preacher's eloquence, he imbibed a strong sense of religion, and devoted himself henceforward more especially to the duties of it. He died at Correggio in 1499; and, as Baronius assures us upon the testimony of what he calls credible authors, appeared immediately after his death to his friend Michael Mercatus: to whom, it seems, he had promised to appear, in order to confirm what he had taught concerning the immortality of the soul. His writings, sacred and profane, which are very numerous, were collected and printed at Venice in 1516, at Basil in 1561 and 1576, and at Paris 1641, in two vols folio. Twelve books of his Epistles, among which are many treatises, were printed separately in folio at Venice 1495, and at Nuremberg 1497, in 4to.

FICOIDES, a name given to several distinct plants,

as the mesembryanthemum, musa, and opuntia. See MESEMBRYANTHEMUM, &c.

FICTION. See FABLE and POETRY.

FICUS, the FIG-TREE: A genus of the triœcia order, belonging to the polygamia class of plants; and in the natural method ranking under the 53d order, *Scabridæ*. The receptacle is common, turbinate, carnosous, and connivent; inclosing the florets either in the same or in a distinct one. The male calyx is tripartite; no corolla; three stamina: The female calyx is quinquepartite; no corolla; one pistil; and one seed.—There are ten species, of which the following are the most remarkable.

1. The Carica, or common Fig, with an upright stem branching 15 or 20 feet high, and garnished with large palmated or hand-shaped leaves. Of this there are a number of varieties; as the common fig, a large, oblong, dark purplish blue fruit, which ripens in August either on standards or walls, and the tree carries a great quantity of fruit.—The brown or chestnut fig; a large, globular, chestnut-coloured fruit, having a purplish delicious pulp, ripening in July and August.—The black Ischia fig; a middle-sized, shortish, flat-crowned, blackish fruit, having a bright pulp; ripening in the middle of August.—The green Ischia fig; a large, oblong, globular-headed, greenish fruit, slightly stained by the pulp to a reddish-brown colour; ripens in the end of August.—The brown Ischia fig; a small, pyramidal, brownish-yellow fruit, having a purplish very rich pulp; ripening in August and September.—The Malta fig; a small flat-topped brown fruit, ripening in the middle of August or beginning of September.—The round brown Naples fig; a globular, middle-sized, light-brown fruit, and brownish pulp; ripe in the end of August.—The long, brown, Naples fig; a long dark-brown fruit, having a reddish pulp; ripe in September.—The great blue fig; a large blue fruit, having a fine red pulp.—The black Genoa fig; a large, pear-shaped, black-coloured fruit, with a bright red pulp; ripe in August.

2. The Sycamorus, or Sycamore of scripture. According to Mr Hasselquist, this is a huge tree, the stem being often 50 feet round. The fruit is pierced in a remarkable manner by an insect. There is an opening made in the calyx near the time the fruit ripens, which is occasioned in two different ways. 1. When the squamæ, which cover the calyx, wither and are bent back; which, however, is more common to the carica than the sycamore. 2. A little below the scales, on the side of the flower-cup, there appears a spot before the fruit is ripe: the fruit in this place is affected with a gangrene which extends on every side, and frequently occupies a finger's-breadth. It withers; the place affected becomes black; the fleshy substance in the middle of the calyx, for the breadth of a quill, is corroded; and the male blossoms, which are nearest to the bare side, appear naked, opening a way for the insect, which makes several furrows in the inside of the fruit, but never touches the stigmata, though it frequently eats the germen. The wounded or gangrenous part is at first covered or shut up by the blossoms; but the hole is by degrees opened and enlarged of various sizes in the different fruits; the margin and sides being always gangrenous, black, hard, and turned inwardly. The same gangrenous appearance is also

Fiction,
Ficus.

Ficus.

found near the squamæ, after the insect has made a hole in that place. The tree is very common in the plains and fields of Lower Egypt. It buds in the latter end of March, and the fruit ripens in the beginning of June. It is wounded or cut by the inhabitants at the time it buds; for without this precaution, they say it would not bear fruit.

3. The Religiosa, or Banian-tree, is a native of several parts of the East Indies. It hath a woody stem, branching to a great height and vast extent; with heart-shaped entire leaves ending in acute points. Of this tree the following lines of Milton contain a description equally beautiful and just:

—There soon they chose
The fig tree; not that tree for fruit renown'd,
But such as, at this day to Indians known
In Malabar or Decan, spreads her arms,
Branching so broad and long, that in the ground
The bended twigs take root, and daughters grow
About the mother tree, a pillar'd shade,
High over arch'd, and echoing walks between:
There oft the Indian herdsman, shunning heat,
Shelters in cool, and tends his pasturing herds
At loop-holes cut through thickest shade.

PAR. LOST, Book ix. l. 1100.

The Banian-tree, or Indian fig, is perhaps the most beautiful of Nature's productions in that genial climate, where she sports with the greatest profusion and variety. Some of these trees are of amazing size and great extent, as they are continually increasing, and, contrary to most other things in animal and vegetable life, they seem to be exempted from decay. Every branch from the main body throws out its own roots; at first, in small tender fibres, several yards from the ground: these continually grow thicker until they reach the surface; and there striking in, they increase to large trunks, and become parent-trees, shooting out new branches from the top: these in time suspend their roots, which, swelling into trunks, produce other branches; thus continuing in a state of progression as long as the earth, the first parent of them all, contributes her sustenance. The Hindoos are peculiarly fond of the Banian-tree; they look upon it as an emblem of the Deity, from its long duration, its out-stretching arms, and overshadowing beneficence; they almost pay it divine honours, and,

"Find a fane in every sacred grove."

Near these trees the most esteemed pagodas are generally erected; under their shade the Brahmins spend their lives in religious solitude; and the natives of all casts and tribes are fond of recreating in the cool recesses, beautiful walks, and lovely vistas of this umbrageous canopy, impervious to the hottest beams of a tropical sun.

A remarkable large tree of this kind grows on an island in the river Nerbedda, ten miles from the city of Baroche in the province of Guzerat, a flourishing settlement lately in possession of the East India company, but ceded by the government of Bengal, at the treaty of peace concluded with the Mahrattas in 1783, to Mahdajee Scindia a Mahratta chief. It is distinguished by the name of Cubbeer Burr, which was given it in honour of a famous saint. It was once much larger than at present; but high floods have carried away the banks of the island where it grows, and with them such parts of the tree as had thus far extended their roots: yet what remains is about 2000 feet in circumference, measured round the principal stems; the

over-hanging branches, not yet struck down, cover a much larger space. The chief trunks of this single tree (which in size greatly exceed our English elms and oaks), amount to 350; the smaller stems, forming into stronger supporters, are more than 3000; and every one of these is casting out new branches, and hanging roots, in time to form trunks, and become the parents of a future progeny. Cubbeer Burr is famed throughout Hindostan for its great extent and surpassing beauty: the Indian armies generally encamp around it; and, at stated seasons, solemn jatarras, or Hindoo festivals, are held there, to which thousands of votaries repair from various parts of the Mogul empire. It is said that 7000 persons find ample room to repose under its shade. The English gentlemen, on their hunting and shooting parties, used to form extensive encampments, and spend weeks together under this delightful pavilion, which is generally filled with green wood pigeons, doves, peacocks, and a variety of feathered songsters; crowded with families of monkies performing their antic tricks; and shaded by bats of a large size, many of them measuring upwards of six feet from the extremity of one wing to the other. This tree not only affords shelter, but sustenance, to all its inhabitants, being covered amid its bright foliage with small figs of a rich scarlet, on which they all regale with as much delight, as the lords of creation on their more costly fare in their parties.

Culture. The carica is the species of ficus most frequently cultivated in this country, and the only one which does not require to be kept in a stove. It may be propagated either by suckers arising from the roots by layers, or by cuttings. The suckers are to be taken off as low down as possible; trim off any ragged part at bottom, leaving the tops entire, especially if for standards; and plant them in nursery-lines at two or three feet distance from each other, or they may at once be planted where they are to remain; observing, that if they are designed for walls or espaliers, they may be headed to six or eight inches in March, the more effectually to force out lateral shoots near the bottom; but, if intended for standards, they must not be topped, but trained with a stem, not less than 15 or 18 inches for dwarf-standards, a yard for half-standards, and four, five, or six feet for full standards. Then they must be suffered to branch out to form a head; observing, that, whether against walls, espaliers, or standards, the branches or shoots must never be shortened unless to procure a necessary supply of wood: for the fruit is always produced on the upper parts of the young shoots; and if these are cut off, no fruit can be expected.—The best season for propagating these trees by layers is in autumn; but it may be also done any time from October to March or April. Choose the young pliable lower shoots from the fruitful branches: lay them in the usual way, covering the body of the layers three or four inches deep in the ground, keeping the top entire, and as upright as possible; and they will be rooted and fit to separate from the parent in autumn; when they may be planted either in the nursery, or where they are to remain, managing them as above directed. The time for propagating by cuttings is either in autumn at the fall of the leaf, or any time in March: choose well-ripened shoots of the preceding summer; short, and of robust growth, from about 12 to 15 inches long; having an inch or two of the two-years wood at their base, the tops left entire; and plant

Ficus.

Ficus,
Field.

them six or eight inches deep, in a bed or border of good earth, in rows two feet asunder: and when planted in autumn, it will be eligible to protect their tops in time of hard frost, the first winter, with any kind of long loose litter.

That part of the history of the fig-tree, which for many ages was so enigmatical, namely, the *caprifig*, as it is called, is particularly worthy of attention, not only as a singular phenomenon in itself, but as it has furnished one of the most convincing proofs of the reality of the sexes of plants. In brief it is this: The flowers of the fig-tree are situated within a pulpy receptacle, which we call the fig or fruit: of these receptacles, in the wild fig-tree, some have male flowers only, and others have male and female, both distinct, though placed in the same receptacle. In the cultivated fig, these are found to contain only female flowers; which are fecundated by means of a kind of gnat bred in the fruit of the wild fig-trees, which pierces that of the cultivated, in order to deposit its eggs within; at the same time diffusing within the receptacle the farina of the male flowers. Without this operation the fruit may ripen, but no effective seeds are produced: hence the garden fig can only be propagated by layers and cuttings, in those countries where the wild fig is not known. The process of thus ripening the fruit, in the oriental countries, is not left to nature, but is managed with great art, and different degrees of dexterity, so as to reward the skilful husbandman with a much larger increase of fruit than would otherwise be produced. A tree of the same size, which, in Provence, where caprifiguration is not practised, may produce about 25 pounds of fruit, will, by that art, in the Grecian islands, bring ten times that quantity. See the article *CAPRIFICATION*.

Uses. Figs are a considerable article in the materia medica, chiefly employed in emollient cataplasms and pectoral decoctions. The best are those which come from Turkey. Many are also brought from the south of France, where they prepare them in the following manner. The fruit is first dipped in scalding hot lye made of the ashes of the fig-tree, and then dried in the sun. Hence these figs stick to the hands, and scour them like lixivial salts; and for the same reason they excite to stool, without griping. They are moderately nutritive, grateful to the stomach, and easier to digest than any other of the sweet fruits. They have been said to produce lice when eaten as a common food; but this seems to be entirely without foundation. The reason of this supposition seems to be, that in the countries where they grow naturally, they make the principal food of the poor people, who are generally troubled with these vermin. The wood of the fig-tree is not subject to rot; and has therefore been used for making of coffins, in which embalmed bodies were put. Mr Haffelquist affirms, that he saw in Egypt coffins made of this kind of wood, which had been preserved sound for 2000 years.

FIDD, an iron pin used at sea to splice or fasten ropes together; it is made tapering and sharp at one end.

There are also fidds of wood, which are much larger than the iron ones.

The pin also in the heel of the topmast, which bears it upon the cheff-tree, is called a *fidd*.

FIDD-Hammer, is used for a hammer, the handle of which is a fidd, or made tapering into that form.

FIDDLE. See *VIOLIN*.

FIDDLE-Wood. See *CITHAREXELON*.

FIDDES (Richard), a learned divine and polite writer, was born in 1671, and educated at Oxford. He was presented to the living of Haltham in Yorkshire, where he was so admired for the sweetness of his voice and the gracefulness of his delivery, that the people for several miles round flocked to his sermons. Coming to London in 1712, he was, by the favour of Dean Swift, introduced to the earl of Oxford, who made him one of his chaplains, and the queen soon after appointed him chaplain to the garrison at Hull: but losing his patrons upon the change of the ministry, he lost his chaplainship; and being obliged to apply himself to writing, composed, 1. *A Body of Divinity*; 2. *The Life of Cardinal Wolsey*; 3. *A Treatise of Morality*, &c. He died in 1725.

FIDE-JUSSORES *Affidui*. See *ASSIDUUS*.

FIDE-Jussor, in the civil law, is a surety, or one that obliges himself in the same contract with a principal, for the greater security of the creditor or stipulator.

FIDEI-COMMISSUM, in Roman antiquity, an estate left in trust with any person, for the use of another. See *TRUSTEE*.

FIDENA, or *FIDENÆ*, (anc. geog.) a town of the Sabines, five miles to the north of Rome, where traces of it are still to be seen. Fidenates, the people; (Livy.)

FIDES, FAITH or FIDELITY, one of the virtues deified by the Pagans. She had a temple near the Capitol, founded by Numa Pompilius; but no animals were offered, or blood spilt, in her sacrifices. During the performance of her rites, her priests appeared in white vestments, with their heads and hands covered with linen, to show that fidelity ought to be sacred.

FIDIUS, in Pagan worship, a god who presided over alliances and promises. This deity, which the Romans borrowed from the Sabines, was also called *Sancus*, *Semon*, and *Semi-pater*.

FIELD, in agriculture, a piece of ground inclosed, whether for tillage or pasture.

FIELD, in heraldry, is the whole surface of the shield or the continent, so called because it containeth those achievements anciently acquired in the field of battle. It is the ground on which the colours, bearing, metals, furs, charges, &c. are represented. Among the modern heralds, field is less frequently used in blazoning than shield or escutcheon. See the article *SHIELD*, &c.

FIELD Book, in surveying, that wherein the angles, stations, distances, &c. are set down.

FIELD-Colours, in war, are small flags of about a foot and half square, which are carried along with the quarter-master general, for marking out the ground for the squadrons and battalions.

FIELD-Fare, in ornithology. See *TURDUS*.

FIELD-Officers, in the art of war. See *OFFICER*.

FIELD-Pieces, small cannons, from three to twelve pounders, carried along with an army in the field.

FIELD-Staff, a weapon carried by the gunners, about the length of a halbert, with a spear at the end; having on each side ears screwed on, like the cock of a match-lock, where the gunners screw in lighted matches when

Fiddle
||
Field.

Field
||
Fife

when they are upon command; and then the field-staffs are said to be armed.

FIELD Works, in fortification, are those thrown up by an army in besieging a fortress, or by the besieged to defend the place. Such are the fortifications of camps, highways, &c.

Elysian FIELDS. See *ELYSIAN*.

FIELDING (Henry), a well known writer of the present age, son of lieutenant-general Fielding who served under the duke of Marlborough, was born in 1707. He had four sisters; of whom Sarah is well known, as writer of *The Adventures of David Simple*. On the death of his mother, his father married again; and Sir John Fielding, who succeeded him in the commission of the peace for Middlesex, is his brother by this marriage. Henry was sent to study at Leyden; but a failure in his remittances obliged him to return in two years, when his own propensity to gaiety and profusion drove him to write for the stage at 20 years of age. His first dramatic piece, *Love in several Masques*, which was well received, appeared in 1727: and all his plays and farces, to the amount of 18, were written before the year 1737; and many of them are still acted with applause. While he was thus employed, he married a young lady with 1500*l.* fortune, and inherited an estate of 200*l.* a-year from his mother: all which, though on the plan of retiring into the country, he contrived to dissipate in three years; and then applied himself to the study of the law for a maintenance. In losing his fortune, he acquired the gout: which rendering it impossible for him to attend the bar, he with a shattered constitution had recourse to many extempore applications of his pen for immediate supplies; until, soon after the late rebellion, he accepted the office of acting justice for Middlesex, an employment much more profitable than honourable in the public esteem. Reduced at length by the fatigues of this office, and by a complication of disorders, he by the advice of his physicians went to Lisbon, where he died in 1754. He wrote a great number of fugitive pamphlets and periodical essays; but is chiefly distinguished by his *Adventures of Joseph Andrews*, and *History of Tom Jones*. His works have been collected and published, with his life prefixed, by Mr Murphy.

FIENUS (Thomas), an ingenious and learned physician, born at Antwerp in 1566. He went into Italy to study physic under Mercurialis and Aldrovandus; and on his return distinguished himself so much in the university of Louvain, that he was there chosen professor of physic, and was afterwards made physician to the duke of Bavaria. He wrote several works, among which were, *De viribus imaginationis*; and *De formatione fetus*. He died at Louvain in 1631.

FIERI FACIAS, in law, a writ that lies where a person has recovered judgment for debt or damages in the king's courts against one, by which the sheriff is commanded to levy the debt and damages on the defendant's goods and chattels.

FIFE, in music, is a sort of wind-instrument, being a small pipe. See *PIPE*.

FIFE, a county of Scotland, bounded on the west by Clackmannan and Perthshire, on the north by Perthshire only, on the north-east by the river Tay, on the

east by the German ocean, and on the south by the Frith of Forth. It is above 32 miles long, and 17 broad; though along the coast, from Crail to Culrofs, it extends about 40 miles in length. The face of the country is various. Towards the west it is mountainous, having the Lomond hills rising to a great height; to the east it is flat, well cultivated, and produces grain of all kinds in great plenty. It is full of towns; and has many good bays and harbours, which breed great number of hardy seamen. Formerly these towns carried on very extensive trade, but now are gone into decay; though, being all royal boroughs, they send several members to parliament. The hills are covered with sheep and black cattle; coal, with which the county abounds, is shipped off in great quantities; and the linen-manufacture is carried on to a considerable extent. The principal rivers are the Leven and the Eden, which produce trout and other fish of various kinds.—Fife is the most populous county in Scotland, having one full synod and four presbytery-seats within itself. It sends one member to parliament; and gives an Irish title of *earl* to the Duffs of Braco, the descendants of the ancient Thanes of Fife. Cupar is the county-town.

FIRE-Rails, in a ship, are those that are placed on banisters, on each side of the top of the poop, and so along with haunces or falls. They reach down to the quarter-deck, and to the stair of the gang-way.

FIFTH, in music. See *INTERVAL*.

FIG, or **FIG-TREE**. See *FICUS*.

FIGWORT, a plant called by the botanists *SCROPHULARIA*.

FIGURAL, **FIGURATE**, or *Figurative*, a term applied to whatever is expressed by obscure resemblances. The word is chiefly applied to the types and mysteries of the Mosaic law; as also to any expression which is not taken in its primary and literal sense.

FIGURE, in physics, expresses the surface or terminating extremities of any body.

FIGURES, in arithmetic, are certain characters whereby we denote any number which may be expressed by any combination of the nine digits, &c. See *ARITHMETIC*.

FIGURE, among divines, is used for the mysteries represented under certain types.

FIGURE, in dancing, denotes the several steps which the dancer makes in order and cadence, considered as they mark certain figures on the floor. See *DANCING*.

FIGURE, in painting and designing, denotes the lines and colours which form the representation of any animal, but more particularly of a human personage. See the article *PAINTING*.

FIGURE, in the manufactures, is applied to the various designs represented or wrought on velvets, damasks, taffeties, sattins, and other stuffs and cloths.

The most usual figures for such designs are flowers, imitated from the life; or grotesques, and compartments of pure fancy. Representations of men, beasts, birds, and landscapes, have only been introduced since the taste for the Chinese stuffs, particularly those called *swares*, began to prevail among us. It is the woof of the stuff that forms the figures; the warp only serves for the ground. In working figured stuffs, there is required a person to show the workman how

Fife
||
Figure.

fars

Figure. far he must raise the threads of the warp, to represent the figure of the design with the woof, which is to be passed across between the threads thus raised. This some call *reading the design*.

For the figures on tapestry, brocade, &c. see TAPESTRY, &c.

For those given by the calenders, printers, &c. see CALENDER, &c.

FIGURE, in logic, denotes a certain order and disposition of the middle term in any syllogism.

Figures are fourfold. 1. When the middle term is the subject of the major proposition, and the predicate of the minor, we have what is called the first figure. 2. When the middle term is the predicate of both the premisses, the syllogism is said to be in the second figure. 3. If the middle term is the subject of the two premisses, the syllogism is in the third figure: and, lastly, by making it the predicate of the major, and subject of the minor, we obtain syllogisms in the fourth figure. Each of these figures has a determinate number of moods, including all the possible ways in which propositions differing in quantity or quality can be combined, according to any disposition of the middle term, in order to arrive at a just conclusion. See LOGIC.

FIGURE, in composition. See ORATORY; also ALLEGORY, APOSTROPHE, HYPERBOLE, METAPHOR, PERSONIFICATION, &c.

Elem. of Criticism.

A **FIGURE**, the means or instrument conceived to be the agent. When we survey a number of connected objects, that which makes the greatest figure employs chiefly our attention; and the emotion it raises, if lively, prompts us even to exceed nature in the conceptions we form of it. Take the following examples.

For Neleus' son Alcides' rage had slain.

A broken rock the force of Pirus threw.

In these instances, the rage of Hercules and the force of Pirus, being the capital circumstances, are so far exalted as to be conceived the agents that produce the effects.

In the first of the following instances, hunger being the chief circumstance in the description, is itself imagined to be the patient.

Whose hunger has not tasted food these three days.

Jane Shore.

As when the force

Of subterranean wind transports a hill. *Paradise Lost.*

As when the potent rod

Of Amram's son, in Egypt's evil day

Wav'd round the coast, upcall'd a pitchy cloud

Of locusts.

Paradise Lost.

A **FIGURE**, which, among related objects, extends the properties of one to another. This figure is not dignified with a proper name, because it has been overlooked by writers. *Giddy brink*, *jovial wine*, *daring wound*, are examples of this figure. Here are adjectives that cannot be made to signify any quality of the substantives to which they are joined: a *brink*, for example, cannot be termed *giddy* in a sense, either proper or figurative, that can signify any of its qualities or attributes. When we examine attentively the expression, we discover, that a *brink* is termed *giddy* from producing that effect in those who stand on it: in the same manner, a wound is said to be *daring*, not with respect to itself, but with respect to the boldness of the person who in-

flicts it: and wine is said to be *jovial*, as inspiring mirth and jollity. Thus the attributes of one subject are extended to another with which it is connected; and the expression of such a thought must be considered as a figure, because the attribute is not applicable to the subject in any proper sense.

How we are to account for this figure, which we see lies in the thought, and to what principle shall we refer it? Have poets a privilege to alter the nature of things, and at pleasure to bestow attributes upon a subject to which they do not belong? It is observed †, that the mind passeth easily and sweetly along a train of connected objects; and, where the objects are intimately connected, that it is disposed to carry along the good or bad properties of one to another; especially when it is in any degree inflamed with these properties. From this principle is derived the figure under consideration. Language, invented for the communication of thought, would be imperfect, if it were not expressive even of the slightest propensities and more delicate feelings: but language cannot remain so imperfect among a people who have received any polish; because language is regulated by internal feeling, and is gradually improved to express whatever passes in the mind. Thus, for example, when a sword in the hand of a coward is termed a *coward sword*, the expression is significative of an internal operation; for the mind, in passing from the agent to its instrument, is disposed to extend to the latter the properties of the former. Governed by the same principle, we say *listening fear*, by extending the attribute *listening* of the man who listens, to the passion with which he is moved. In the expression *bold deed*, or *audax facinus*, we extend to the effect what properly belongs to the cause. But not to waste time by making a commentary upon every expression of this kind, the best way to give a complete view of the subject, is to exhibit a table of the different relations that may give occasion to this figure. And in viewing the table, it will be observed, that the figure can never have any grace but where the relations are of the most intimate kind.

1. An attribute of the cause expressed as an attribute of the effect.

Audax facinus.

Of yonder fleet a bold discovery make.

An impious mortal gave the daring wound.

To my advent'rous song,

That with no middle flight intends to soar. *Paradise Lost.*

2. An attribute of the effect expressed as an attribute of the cause.

Quos periisse ambos misero censebam in mari. *Plautus.*

No wonder, fallen such a pernicious height.

Paradise Lost.

3. An effect expressed as an attribute of the cause.

Jovial wine, Giddy brink, Drowsy night, Musing midnight, Panting height, Astonish'd thought, Mournful gloom.

Casting a dim religious light.

MILTON, *Comus.*

And the merry bells ring round,

And the jocund rebecks found.

MILTON, *Allegro.*

4. An attribute of a subject bestowed upon one of its parts or members.

Longing arms.

It was the nightingale, and not the lark,

That pierc'd the fearful hollow of thine ear.

Romeo and Juliet, act 3. sc 7.

— Oh,

Figure.

† Vid. *Elem. of Criticism*, ch. ii. part 1. § 6.

Figure.

Oh, lay by
Those most ungentle looks and angry weapons:
Unless you mean my griefs and killing fears
Should stretch me out at your *relentless* feet.
Fair Penitent, act 3.

And ready now
To stoop with *wearied* wing, and *willing* feet,
On the bare outside of this world. *Paradise Lost, b. 3.*

5. A quality of the agent given to the instrument with which it operates.

Why peep your *coward* swords half out their shells?

6. An attribute of the agent given to the subject upon which it operates.

High-climbing hill *Milton.*

7. A quality of one subject given to another.

Ecce, beatis nunc Arabum invades
Gazis. *Horat. Carm. l. 1. ode 29.*

When *sapless* age, and weak unable limbs,
Should bring thy father to his *drooping* chair.
Shakespeare.

By art, the pilot through the boiling deep,
And howling tempest, steers the *fearless* ship.
Iliad, xxiii. 385.

Then, nothing loth, th' *enamour'd* fair he led,
And sunk transported on the *conscious* bed.
Odyssey, viii. 337.

A *stupid* moment motionless the flood.
Summer, l. 1336.

8. A circumstance connected with a subject, expressed as a quality of the subject.

Breezy summit.
'Tis ours the chance of *fighting* fields to try.
Iliad, i. 301.

Oh! had I dy'd before that *well-fought* wall.
Odyssey, v. 395.

From this table it appears, that the adorning a cause with an attribute of the effect, is not so agreeable as the opposite expression. The progress from cause to effect is natural and easy: the opposite progress resembles retrograde motion*; and therefore *panting* height, *astonish'd* thought, are strained and uncouth expressions, which a writer of taste will avoid.

It is not less strained, to apply to a subject in its present state, an epithet that may belong to it in some future state:

Submersaque obrue puppes. *Æneid, i. 73.*
And mighty ruins fall. *Iliad, v. 411.*
Impious sons their *mangled* fathers wound.

Another rule regards this figure, That the property of one subject ought not to be bestowed upon another with which that property is incongruous.

K. Rich.——How dare thy joints forget
To pay their *awful* duty to our presence?
Richard II. act 3. sc. 6.

The connection between an awful superior and his submissive dependent is so intimate, that an attribute may readily be transferred from the one to the other: but awfulness cannot be so transferred, because it is inconsistent with submission.

FIGURE of Speech, as peculiarly distinguished from the above and from those first referred to.] Under the article *METAPHOR and Allegory*, a figure of speech is defined, "The using a word in a sense different from what is proper to it;" and the new or uncommon sense of the word is termed *the figurative sense*. The figurative sense must have a relation to that which is

proper; and the more intimate the relation is, the figure is the more happy. How ornamental this figure is to language, will not be readily imagined by any one who hath not given peculiar attention; and therefore we shall endeavour to unfold its capital beauties and advantages. In the first place, a word used figuratively, or in a new sense, suggests at the same time the sense it commonly bears: and thus it has the effect to present two objects; one signified by the figurative sense, which may be termed *the principal object*; and one signified by the proper sense, which may be termed *accessory*: the principal makes a part of the thought; the accessory is merely ornamental. In this respect, a figure of speech is precisely similar to concordant sounds in music, which, without contributing to the melody, make it harmonious.

To explain the matter by examples. *Youth*, by a figure of speech, is termed *the morning of life*: This expression signifies *youth*, the principal object which enters into the thought; it suggests, at the same time, the proper sense of *morning*; and this accessory object, being in itself beautiful, and connected by resemblance to the principal object, is not a little ornamental. *Imperious ocean* is an example of a different kind, where an attribute is expressed figuratively: Together with *stormy*, the figurative meaning of the epithet *imperious*, there is suggested its proper meaning, viz. the stern authority of a despotic prince; and these two are strongly connected by resemblance. Upon this figurative power of words, Vida descants with elegance, *Poet. lib. iii. 44.*

In the next place, this figure possesses a signal power of aggrandising an object, by the following means. Words, which have no original beauty but what arises from their sound, acquire an adventitious beauty from their meaning: a word signifying any thing that is agreeable, becomes by that means agreeable; for the agreeableness of the object is communicated to its name. This acquired beauty, by the force of custom, adheres to the word even when used figuratively; and the beauty received from the thing it properly signifies, is communicated to the thing which it is made to signify figuratively. Consider the foregoing expression *Imperious ocean*, how much more elevated it is than *Stormy ocean*.

Thirdly, This figure hath a happy effect by preventing the familiarity of proper names. The familiarity of a proper name is communicated to the thing it signifies by means of their intimate connection; and the thing is thereby brought down in our feeling. This bad effect is prevented by using a figurative word instead of one that is proper; as for example, when we express the sky by terming it *the blue vault of heaven*; for though no work of art can compare with the sky in grandeur, the expression, however, is relished, because it prevents the object from being brought down by the familiarity of its proper name. With respect to the degrading the familiarity of proper names, Vida has the following passage:

Hinc si dura mihi passus dicendus Ulysses,
Non illum vero memorabo nomine, sed qui
Et mores hominum multorum vidit, et urbes,
Naufragus everſæ post ſæva incendia Trojæ.

Poet. lib. ii. l. 46.

Lastly, By this figure, language is enriched, and rendered more copious; in which respect, were there

Figure.

Elem. of
Criticism.

* See PER-
CEPTION
and Ideas in
Train.

no

Figure. no other, a figure of speech is a happy invention. This property is finely touched by Vida; *Poet. lib. iii. 90.*

The beauties we have mentioned belong to every figure of speech. Several other beauties peculiar to one or other sort, we shall have occasion to remark afterward.

Not only subjects, but qualities, actions, effects, may be expressed figuratively. Thus, as to subjects, *gates of breath* for the lips, *the watery kingdom* for the ocean. As to qualities, *ferce* for stormy, in the expression *Fierce winter*; *altus* for profound, *Altus puteus, Altum mare*; *breathing* for perspiring, *Breathing plants*. Again, as to actions, *The sea rages*, *Time will melt her frozen thoughts*, *Time kills grief*. An effect is put for the cause, as *lux* for the sun; and a cause for the effect, as *bœum labores* for corn. The relation of resemblance is one plentiful source of figures of speech; and nothing is more common than to apply to one object the name of another that resembles it in any respect: Height, size, and worldly greatness, resemble not each other; but the emotions they produce resemble each other, and, prompted by this resemblance, we naturally express worldly greatness by height or size: One feels a certain uneasiness in seeing a great depth; and, hence depth is made to express any thing disagreeable by excess, as *depth* of grief, *depth* of despair: Again, height of place, and time long past, produce similar feelings; and hence the expression, *Ut altius repetam!* Distance in past time, producing a strong feeling, is put for any strong feeling; *Nihil mihi antiquius nostra amicitia*: Shortness with relation to space, for shortness with relation to time; *Brevis esse laboro, obscurus fio*: Suffering a punishment resembles paying a debt; hence *pendere penas*. In the same manner, light may be put for glory, sunshine for prosperity, and weight for importance.

Many words, originally figurative, having, by long and constant use, lost their figurative power, are degraded to the inferior rank of proper terms. Thus the words that express the operation of the mind, have in all languages been originally figurative: the reason holds in all, that when these operations came first under consideration, there was no other way of describing them but by what they resembled: it was not practicable to give them proper names, as may be done to objects that can be ascertained by sight and touch. A *soft* nature, *jarring* tempers, *weight* of woe, *pompous* phrase, *beget* compassion, *assuage* grief, *break* a vow, *bend* the eye downward, *shower* down curses, *drown'd* in tears, *wrapt* in joy, *warm'd* with eloquence, *loaded* with spoils, and a thousand other expressions of the like nature, have lost their figurative sense. Some terms there are that cannot be said to be altogether figurative or altogether proper: originally figurative, they are tending to simplicity, without having lost altogether their figurative power. Virgil's *Regina saucia cura*, is perhaps one of these expressions: with ordinary readers, *sauca* will be considered as expressing simply the effect of grief; but one of a lively imagination will exalt the phrase into a figure.

* *Elem. of Criticism*, 11. 305.

For epitomising this subject, and at the same time for giving a clear view of it, Lord Kames* gives a list of the several relations upon which figures of speech are commonly founded. This list he divides into two

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tables; one of subjects expressed figuratively, and one of attributes.

TAB. I. Subjects expressed figuratively.

1. A word proper to one subject employed figuratively to express a resembling subject.

There is no figure of speech so frequent, as what is derived from the relation of resemblance. Youth, for example, is signified figuratively by the *morning* of life. The life of a man resembles a natural day in several particulars: the morning is the beginning of a day, youth the beginning of life; the morning is cheerful, so is youth, &c. By another resemblance, a bold warrior is termed the *thunderbolt* of war; a multitude of troubles, a *sea* of troubles.

This figure, above all others, affords pleasure to the mind by variety of beauties. Besides the beauties above-mentioned, common to all sorts, it possesses in particular the beauty of a metaphor or of a simile: a figure of speech built upon resemblance, suggests always a comparison between the principal subject and the accessory; whereby every good effect of a metaphor or simile may, in a short and lively manner, be produced by this figure of speech.

2. A word proper to the effect employed figuratively to express the cause.

Lux for the sun; *Shadow* for cloud. A helmet is signified by the expression *glittering terror*; a tree by *shadow* or *umbrage*. Hence the expression,

Nec habet Pelion umbras.

Ovid.

Where the dun umbrage hangs.

Spring, l. 1023.

A wound is made to signify an arrow:

Vulnere non pedibus te consequar.

Ovid.

There is a peculiar force and beauty in this figure: the word which signifies figuratively the principal subject, denotes it to be a cause by suggesting the effect.

3. A word proper to the cause employed figuratively to express the effect.

Bœumque labores for corn. *Sorrow* or *grief* for tears.

Again Ulysses veil'd his pensive head;

Again, unmann'd, a show'r of sorrow shed.

Streaming Grief his faded cheek bedew'd.

Blindness for darkness:

Cæcis eramus in undis.

Æneid. iii. 200.

There is a peculiar energy in this figure, similar to that in the former: the figurative name denotes the subject to be an effect, by suggesting its cause.

4. Two things being intimately connected, the proper name of the one employed figuratively to signify the other.

Day for light. *Night* for darkness; and hence, A sudden night. *Winter* for a storm at sea:

Interea magno miseri murmure pontum,

Enissamque Hyemem sensit Neptunus.

Æneid. i. 128.

This last figure would be too bold for a British writer, as a storm at sea is not inseparably connected with winter in this climate.

5. A word proper to an attribute, employed figuratively to denote the subject.

Youth and *beauty* for those who are young and beautiful:

Youth and beauty shall be laid in dust.

Majesty

Figure.

Majesty for the king:

What art thou, that usurp'st this time of night,
Together with that fair and warlike form
In which the *Majesty* of buried Denmark
Did sometime march? *Hamlet, act I. sc. 1.*

—— Or have ye chosen this place
After the toils of battle, to repose
Your weary'd virtue? *Paradise Lost.*

Verdure for a green field. *Summer, l. 301.*

Speaking of cranes,

The piny nations, wounds and death they bring,
And all the *war* descends upon the wing. *Iliad. iii. 10.*
Coolage advances venerably wife. *Iliad. iii. 149.*

The peculiar beauty of this figure arises from suggesting an attribute that embellishes the subject, or puts it in a stronger light.

6. A complex term employed figuratively to denote one of the component parts.

Funus for a dead body. *Burial* for a grave.

7. The name of one of the component parts instead of the complex term.

Teda for a marriage. The *East* for a country situated east from us. *Jovis vestigia servat*, for imitating Jupiter in general.

8. A word signifying time or place, employed figuratively to denote what is connected with it.

Clime for a nation, or for a constitution of government: hence the expression, *Merciful clime*, *Fleecy winter* for snow, *Seculum felix*.

9. A part for the whole.

The *pole* for the earth. The *head* for the person:

Triginta minas pro capite tuo dedi. *Plautus.*

Tergum for the man:

Fugiens tergum. *Ovid.*

Vultus for the man:

Jam fulgor armorum fugaces
Terret equos, equitumque vultus. *Horat.*

Quis desiderio sit pudor aut modus
Tam chari capitis? *Horat.*

Dumque virent genua? *Horat.*

Thy growing virtues justify'd my cares,
And promis'd comfort to my silver hairs. *Iliad, ix. 616.*

—— Forthwith from the pole he rears

His mighty stature. *Paradise Lost.*

The silent heart which grief assails. *Parnel.*

The peculiar beauty of this figure consists in marking that part which makes the greatest figure.

10. The name of the container, employed figuratively to signify what is contained.

Grove for the birds in it; *Vocal grove*. *Ships* for the seamen; *Agonizing ships*. *Mountains* for the sheep pasturing upon them, *Bleating mountains*. *Zacynthus*, *Ithaca*, &c. for the inhabitants. *Ex mastris domibus*, *Livy*.

11. The name of the sustainer, employed figuratively to signify what is sustained.

Altar for the sacrifice. *Field* for the battle fought upon it, *Well-fought field*.

12. The name of the materials, employed figuratively to signify the things made of them.

Ferrum for *gladius*.

13. The names of the Heathen deities, employed figuratively to signify what they patronise.

Jove for the air, *Mars* for war, *Venus* for beauty, *Cupid* for love, *Ceres* for corn, *Neptune* for the sea, *Vulcan* for fire.

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This figure bestows great elevation upon the subject; and therefore ought to be confined to the higher strains of poetry.

Figure.

TAB. II. Attributes expressed figuratively.

1. When two attributes are connected, the name of the one may be employed figuratively to express the other.

Purity and virginity are attributes of the same person: hence the expression, *Virgin snow*, for pure snow.

2. A word signifying properly an attribute of one subject, employed figuratively to express a resembling attribute of another subject.

Tottering state. *Imperious ocean*. *Angry flood*. *Raging tempest*. *Shallow fears*.

My sure divinity shall bear the shield,
And edge thy sword to reap the glorious field.
Odyssey, xx. 61.

Black omen, for an omen that portends bad fortune.

Ater omen. *Virgil.*

The peculiar beauty of this figure arises from suggesting a comparison.

3. A word proper to the subject, employed to express one of its attributes.

Mens for *intellectus*. *Mens* for a resolution:

Istam, oro, exue mentem.

4. When two subjects have a resemblance by a common quality, the name of the one subject may be employed figuratively to denote that quality in the other:

Summer life for agreeable life.

5. The name of the instrument made to signify the power of employing it:

—— Melpomene, cui liquidam pater
Vocem cum cithara dedit.

The ample field of figurative expression displayed in these tables, affords great scope for reasoning. Several of the observations relating to metaphor*, are applicable to figures of speech: these shall be slightly retouched, with some additions peculiarly adapted to the present subject. * See Metaphor.

1. As the figure under consideration is built upon relation, we find from experience, and it must be obvious from reason, that the beauty of it depends on the intimacy of the relation between the figurative and proper sense of the word. A slight resemblance, in particular, will never make this figure agreeable: the expression, for example, *Drink down a secret*, for listening to a secret with attention, is harsh and uncouth, because there is scarce any resemblance between *listening* and *drinking*. The expression *weighty crack*, used by Ben Johnson for *loud crack*, is worse if possible: a loud sound has not the slightest resemblance to a piece of matter that is weighty.

Phemius! let acts of gods, and heroes old,
What ancient bards in hall and bow'r have told,
Attenuer'd to the lyre, your voice employ,
Such the pleas'd ear will drink with silent joy.
Odyssey, i. 433.

Strepitumque exterritus hausit. *Æneid, vi. 559.*

—— Write, my queen,
And with mine eyes I'll drink the words you send.
Cymbeline, act I. sc. 2.

As thus th' effulgence tremulous I drink.
Summer, l. 1684.

G g

Neque

Figure.

Neque audit currus habenas.

Georg. i. 514.

O prince! (Lycaon's valiant son rejoy'd),
As thine the steeds, be thine the task to guide.
The horses practis'd to their lord's command,
Shall bear the rein, and answer to thy hand. *Iliad*, v. 288.

The following figures of speech seem altogether wild and extravagant, the figurative and proper meaning having no connection whatever. *Moving* softness, *Freshness breathes*, *Breathing* prospect, *Flowing* spring, *Dewy* light, *Lucid* coolness, and many others of this false coin, may be found in Thomson's *Seasons*.

2. The proper sense of the word ought to bear some proportion to the figurative sense, and not soar much above it, nor sink much below it. This rule, as well as the foregoing, is finely illustrated by Vida, *Poet.* iii. 148.

3. In a figure of speech, every circumstance ought to be avoided that agrees with the proper sense only, not with the figurative sense; for it is the latter that expresses the thought, and the former serves for no other purpose but to make harmony:

Zacynthus green with ever-shady groves,
And Ithaca, presumptuous boast their loves;
Obtruding on my choice a second lord,
They press the Hymenean rite abhor'd.

Odyssey, xix. 152.

Zacynthus here standing figuratively for the inhabitants, the description of the island is quite out of place: it puzzles the reader, by making him doubt whether the word ought to be taken in its proper or figurative sense.

Write, my queen,
And with mine eyes I'll drink the words you send,
Though ink be made of gall. *Cymbeline*, act i. sc. 2.

The disgust one has to drink ink in reality, is not to the purpose where the subject is drinking ink figuratively.

4. To draw consequences from a figure of speech, as if the word were to be understood literally, is a gross absurdity; for it is confounding truth with fiction:

Be Moubray's fins so heavy in his bosom,
That they may break his foaming courser's back,
And throw the rider headlong in the lists,
A caitiff recreant to my cousin Hereford.

Richard II. act i. sc. 3.

Sin may be imagined heavy in a figurative sense: but weight in a proper sense belongs to the accessory only; and therefore to describe the effects of weight, is to desert the principal subject, and to convert the accessory into a principal:

Cromwell. How does your Grace?
Wolsey. Why, well;

Never so truly happy, my good Cromwell.
I know myself now, and I feel within me
A peace above all earthly dignities,
A still and quiet conscience. The king has cur'd me,
I humbly thank his Grace: and, from these shoulders,
These ruin'd pillars, out of pity, taken
A load would sink a navy, too much honour.

Henry VIII. act 3. sc. 6.

Ulysses speaking of Hector:

I wonder now how yonder city stands,
When we have here the base and pillar by us.

Troilus and Cressida, act 4. sc. 9.

Othello. No; my heart is turn'd to stone: I strike it, and it hurts my hand.

Othello, act 4. sc. 5.

Figure.

Not less, even in this despicable now,
Than when my name fill'd Afric with affrights,
And froze your hearts beneath your torrid zone.

Don Sebastian King of Portugal, act i.

How long a space, since first I lov'd, it is!
To look into a glass I fear,
And am surpris'd with wonder, when I miss
Grey hairs and wrinkles there.

Cowley, vol. i. p. 86.

I chose the flourishing 'st tree in all the park,
With freshest boughs, and fairest head:
I cut my love into its gentle bark,
And in three days behold 'tis dead;
My very written flames so violent be,
They've burnt and wither'd up the tree.

Cowley, vol. i. p. 136.

Ah, mighty Love, that it were inward heat
Which made this precious limbeck sweat!
But what, alas! ah what does it avail
That she weeps tears so wond'rous cold,
As scarce the ass's hoof can hold,
So cold, that I admire they fall not hail?

Cowley, vol. i. p. 132.

Such a play of words is pleasant in a ludicrous poem.

Almeria. O Alphonso, Alphonso!
Devouring seas have wash'd thee from my sight,
No time shall raise thee from my memory;
No, I will live to be thy monument:
The cruel ocean is no more thy tomb;
But in my heart thou art interr'd.

Mourning Bride, act i. sc. i.

This would be very right, if there were any inconsistency in being interred in one place really, and in another place figuratively.

From considering, that a word used in a figurative sense suggests at the same time its proper meaning, we discover a fifth rule, That we ought not to employ a word in a figurative sense, the proper sense of which is inconsistent or incongruous with the subject: for every inconsistency, and even incongruity, though in the expression only and not real, is unpleasant:

Interea genitor Tyberini ad fluminis undam
Vulnera siccat lymphis

Æneid. x. 833.

Tres adeo incerto cæca caligine soles
Erramus pelago, totidem sine sidere noctes.

Æneid. iii. 203.

The foregoing rule may be extended to form a sixth, That no epithet ought to be given to the figurative sense of a word that agrees not also with its proper sense:

Dicat Opuntia
Fratr Megillæ, quo beatus
Vulnere.

Horat. Carm. lib. i. ode 27.

Parcus deorum cultor, et infrequens,
Infans dum sapientia
Consultus erro.

Horat. Carm. l. i. ode 54.

Seventhly, The crowding into one period or thought different figures of speech, is not less faulty than crowding metaphors in that manner: the mind is distracted in the quick transition from one image to another, and is puzzled instead of being pleased:

I am of ladies most deject and wretched,
That suck'd the honey of his music yows.
My bleeding bosom sickens at the sound.

Hamlet.

Ah miser,
Quanta laboras in Charybdi!
Digne puer meliore flamma.
Quæ saga, quis te solvere Theſſalis
Magus venenis, quis poterit deus?

Odyssey, i. 439.

Viz.

Figure.

Vix illigata tetriformi
Pegasus expedit Ghimera.

Horat. Carm. lib. I. ode 27.

Eighthly, if crowding figures be bad, it is still worse to graft one figure upon another: For instance,
While his keen falchion drinks the warriors lives.

Iliad, xi. 211.

A falchion drinking the warriors blood is a figure built upon resemblance, which is passable. But then in the expression, *lives* is again put for *blood*; and by thus grafting one figure upon another, the expression is rendered obscure and unpleasant.

Ninthly, Intricate and involved figures, that can scarce be analysed, or reduced to plain language, are least of all tolerable:

Votis incendimus aras.

Æneid. iii. 279.

————— Onerentque canistris

Dona laboratæ Cereris.

Æneid. viii. 180.

Vulcan to the Cyclopes:

Arma acri faciendâ viro: nunc viribus usus,
Nunc manibus rapidis, omni nunc arte magistra:

Præcipitate moras. —————

Æneid. viii. 441.

————— Huic gladio, perque ærea scuta.

Per tunicam squalentem auro, latus laurit apertum.

Æneid. x. 313.

Scriberis Vario fortis, et hostium

Victor, Mæonii carminis alite.

Horat. Carm. lib. I. ode 6.

Else shall our fates be number'd with the dead.

Iliad, v. 294.

Commatural death the fate of war confounds.

Iliad, viii. 85. and xi. 117.

Speaking of Proteus.

Instant he wears, elusive of the rape,

The mimic force of every savage shape. *Odyssey*, iv. 563.

Rolling convulsive on the floor, is seen

The piteous object of a prostrate queen. *Ibid.* iv. 652.

The mingling tempest weaves its gloom. *Autumn*, 337.

A various sweetness swells the gentle race. *Ibid.* 640.

The distant water-fall swells in the breeze. *Winter*, 738.

In the tenth place, When a subject is introduced by its proper name, it is absurd to attribute to it the properties of a different subject to which the word is sometimes applied in a figurative sense:

Hear me, oh Neptune! thou whose arms are hurl'd
From shore to shore, and gird the solid world.

Odyssey, ix. 617.

Neptune is here introduced personally, and not figuratively for the ocean: the description therefore, which is only applicable to the latter, is altogether improper.

It is not sufficient that a figure of speech be regularly constructed, and be free from blemish: it requires taste to discern when it is proper, when improper; and taste perhaps is our only guide. One, however, may gather from reflections and experience, that ornaments and graces suit not any of the dispiriting passions, nor are proper for expressing any thing grave and important. In familiar conversation, they are in some measure ridiculous: Prospero, in the *Tempest*, speaking to his daughter Miranda, says,

The fringed curtains of thine eyes advance,
And say what thou seest yond

No exception can be taken to the justness of the figure; and circumstances may be imagined to make it

proper: but it is certainly not proper in familiar conversation.

In the last place, Though figures of speech have a charming effect when accurately constructed and properly introduced, they ought, however, to be scattered with a sparing hand: nothing is more luscious, and nothing consequently more satiating, than redundant ornaments of any kind.

FIGURE is used, in theology, for the mysteries represented or delivered obscurely to us under certain types or actions in the Old Testament. Thus manna is held a figure or type of the eucharist; and the death of Abel a figure of the suffering of Christ.

Many divines and critics contend, that all the actions, histories, ceremonies, &c. of the Old Testament, are only figures, types, and prophecies, of what was to happen under the New. The Jews are supposed to have had the figures or shadows, and we the substance.

FIGURE is also applied in a like sense to profane matters; as the emblems, enigmas, fables, symbols, and hieroglyphics, of the ancients.

FIGURED, in general, something marked with figures.

The term *figured* is chiefly applied to stuffs, whereon the figures of flowers, and the like, are either wrought or stamped.

FIGURED, in music, is applied either to simple notes or to harmony: to simple notes, as in these words *figured bass*, to express a bass whose notes carrying chords are subdivided into many other notes of lesser value; to harmony, when, by supposition and in a diatonick procedure, other notes than those which form the chord are employed. See SUPPOSITION.

To *figure* is to pass several notes for one; to form runnings or variations; to add some notes to the air, in whatever manner it be done; in short, it is to give to harmonious sounds a figure of melody, by connecting them with other intermediate sounds.

FILAGO, in botany: A genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked; there is no pappus; the calyx is imbricated; the female florets placed among the scales of the calyx.

FILAMENT, in anatomy, natural history, &c. a term used in the same sense with fibre, for those fine threads whereof the flesh, nerves, skin, plants, roots, &c. are composed. See FIBRE.

Vegetable FILAMENTS form a substance of great use in the arts and manufactures; furnishing thread, cloth, cordage, &c.

For these purposes the filamentous parts of the *Cannabis* and *Linum*, or hemp and flax, are employed among us*. But different vegetables have been employed in different countries for the same uses. Putrefaction destroys the pulpy or fleshy matter, and leaves the tough filaments entire: By curiously putrefying the leaf of a plant in water, we obtain the fine flexible fibres, which constituted the basis of the ribs and minute veins, and which now form as it were a skeleton of the leaf. Alkaline lixivium, in some degree, produce similar effects to putrefaction.

The Sieur de Flacourt, in his history of Madagascar, relates, that different kinds of cloth are prepared

Figure
||
Filaments.

* See Hemp
and Flax;
also Cotton.

Filaments. in that island from the filaments of the bark of certain trees boiled in strong lye; that some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton; that others are coarser and stronger, and last thrice as long as cotton; and that of these the sails and cordage of his vessel were made. See also the article **BARK**.

The same author informs us, that the stalks of nettles are used for the like purposes in his own country, France. And Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by several, that muslin and callico, and most of the Indian linens, are made of nettles.

In some of the Swedish provinces, a strong kind of cloth is said to be prepared from hop-stalks: and in the transactions of the Swedish academy for the year 1750, there is an account of an experiment made in consequence of that report. Of the stalks, gathered in autumn, about as many were taken, as equalled in bulk a quantity of flax that would have produced a pound after preparation. The stalks were put into water, and kept covered therewith during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white: They were spun and woven into six ells of fine strong cloth. The author, Mr Shiller, observes, that hop-stalks take much longer time to rot than flax; and that, if not fully rotted, the woody part will not separate, and the cloth will neither prove white nor fine.

Hemp, flax, and all other vegetable filaments, and thread or cloth prepared from them, differ remarkably from wool, hair, silk, and other animal productions, not only in the principles into which they are resolvable by fire, but likewise in some of their more interesting properties, particularly in their disposition to imbibe colouring matters; sundry liquors, which give a beautiful and durable dye to those of the animal, giving no stain at all to those of the vegetable kingdom.

A solution of copper in aquafortis, which had been changed blue by an addition of volatile spirit, on being mixed with a little solution of tin, became turbid and greenish. Pieces of white silk and flannel boiled, without any previous preparation, in this mixture, received a bright deep yellow dye; whilst pieces of linen, prepared and unprepared, came out as colourless as they were put in.

Fishing-nets are usually boiled with oak-bark or other like astringents, which render them more lasting. Those made of flax receive from this decoction a brownish colour, which, by the repeated alternations of water and air, is in a little time discharged, whilst the fine glossy brown, communicated by the same means to filken nets, permanently resists both the air and water, and stands as long as the animal filaments themselves. In like manner the stain of ink, or the black dye from solutions of iron, mixed with vegetable astringents, proves durable in silk and woollen; but from linen, the astringent matter is extracted by washing, and only the yellow iron-mould remains.

The red decoction of cochineal, which, heightened with a little solution of tin, gives the fiery scarlet dye to wool or silk that have been previously impregnated with solution of tartar, makes no impression upon linen or cotton prepared in the same manner. Mr du

Fay informs us in the Memoirs of the French Academy for the year 1737, that having prepared a mixed cloth whose warp was of wool and the woof of cotton; and thoroughly blended the two together by fulling, he still found the cotton to resist the action of the scarlet liquor, and the wool to receive the same colour from it as wool by itself, the stuff coming out all over marbled fiery and white.

Many other instances of this kind are known too well to the callico-printer; whose grand desideratum it is, to find means of making linen receive the same colours that wool does. The physical cause of the difference is wholly unknown; and indeed, of the theory of dyes in general, we know as yet extremely little. (See **DYEING**.) Are animal filaments tubular, and the colouring atoms received within them? Are vegetable filaments solid, and the colour deposited on the surface? Or does not their different susceptibility of colour depend rather on the different intrinsic properties of the two? There are many instances of a like diversity, even in the metallic kingdom, where a mechanical difference in texture can scarcely be presumed to be the cause: Thus silver receives a deep stain from sulphureous or putrid vapours, or the yolk of a boiled egg, which have no effect upon tin.

FILAMENTS, among botanists. See **BOTANY**, p. 434, col. 1.

FILANDERS, in falconry, a disease in hawks, &c. consisting of filaments or strings of blood coagulated; and occasioned by a violent rupture of some vein, by which the blood, extravasating, hardens into these figures, and incommodes the reins, hips, &c.

FILANDERS, are also worms as small as thread, and about an inch long, that lie wrapt up in a thin skin or net, near the reins of an hawk, apart from either gut or gorge.

This malady is known by the hawk's poverty; by ruffling her tail; by her straining the sit, or perch, with her pounces; and lastly, by croaking in the night, when the filanders prick her. The disease proceeds from bad food; and must be remedied in time, to prevent its spreading over the whole body, and destroying the bird. These must not be killed as other worms are, for fear of imposthumes from their corruption, being incapable of passing away with the hawk's meat. They must only be stupified, to prevent their being offensive; and this is done by giving the hawk a clove of garlic, after which she will feel nothing of the filanders for 40 days. It will be prudent in the falconer, when he observes the hawk poor and low, to give her a clove of garlic once a-month by way of prevention.

FILBERT, or **FILBERD**, the fruit of the corylus, or hazel. See **CORYLUS**.

FILE, among mechanics, a tool used in metal, &c. in order to smooth, polish, or cut.

This instrument is of iron or forged steel, cut in little furrows, with chisels and a mallet, this and that way, and of this or that depth, according to the grain or touch required. After cutting the file, it must be tempered with a composition of chimney-foot, very hard and dry, diluted and wrought up with urine, vinegar, and salt; the whole being reduced to the consistence of mustard. Tempering the files consists in rubbing them over with this composition, and covering them

File,
Filial.

them in loam; after which they are put in a charcoal fire, and taken out by that time they have acquired a cherry colour, which is known by a small rod of the same steel put in along with them. Being taken out of the fire, they are thrown into cold spring-water; and when cold, they are cleaned with charcoal and a rag; and being clean and dry, are kept from rust by laying them up in wheat bran. Iron files require more heating than steel ones. Files are of different forms, sizes, cuts, and degrees of fineness, according to the different uses and occasions for which they are made. See FILING.

FILE, in the art of war, a row of soldiers, standing one behind another, which is the depth of the battalion or squadron. The files of a battalion of foot are generally three deep; as are sometimes those of a squadron of horse. The files must be straight and parallel one to another.

FILE, in law, a thread, string, or wire, upon which writs and other exhibits in courts and offices are fastened or filed, for the more safe keeping, and ready turning to the same. A file is a record of the court; and the filing of a process of a court makes it a record of it. An original writ may be filed after judgment given in the cause, issued forth before; declarations, &c. are to be filed, and affidavits must be filed, some before they are read in court, and some presently when read in court. Before filing a record removed by *certiorari*, the justices of B. R. may refuse to receive it, if it appears to be for delay, &c.; and remand it back for the expedition of justice: but if the *certiorari* be once filed, the proceedings below cannot be revived. An indictment, &c. cannot be amended after it is filed.

FILIAL, something belonging to the relation of son. See SON.

The divines usually distinguish between a *servile* and a *filial* fear. The most abandoned may have a servile fear of God, such as that of a slave to his master; but not a filial fear, *i. e.* a fear resulting from love and respect. See FEAR.

FILIAL Piety, the affectionate attachment of children to their parents; including in it love, reverence, obedience, and relief. These are duties prompted equally by nature and by gratitude, independent of the injunctions of religion. For where shall we find the person who hath received from any one benefits so great or so many, as children from their parents? And it may be truly said, that if persons are undutiful to their parents, they seldom prove good to any other relation. Profane history furnishes many fine examples of this amiable virtue; a few of which we shall select, according to the plan observed in other similar articles.

1. The Roman dictator T. Manlius having exercised great cruelty over the citizens, was cited at the expiration of his office to answer for his conduct. Among other things that were laid to his charge, he was accused of treating with barbarity one of his own sons. Manlius, according to Livy, had no other cause of complaint against this son than his having an impediment in his speech. For this reason he was banished far from the city, from his home, and the company of those of his own age and fortune, and condemned to servile works. All were highly exasperated against such inhuman conduct, except the son himself, who,

under the greatest concern that he should furnish matter of accusation against his father, resolved upon a most extraordinary method to relieve him. One morning, without apprising any body, he came to the city armed with a dagger, and went directly to the house of the tribune Pomponius, who had accused his father. Pomponius was yet in bed. Young Manlius sent up his name, and was immediately admitted by the tribune, who did not doubt but he was come to discover to him some new instances of his father's severity. But Manlius, as soon as he was left alone with the tribune, drew out his dagger, and presented it to his breast; declaring he would stab him that moment if he did not swear in the form he should dictate, "Never to hold the assembly of the people for accusing his father." Pomponius, who saw the dagger glittering at his breast, himself alone without arms, and attacked by a robust young man full of a bold confidence in his own strength, took the oath demanded of him; and afterwards confessed with a kind of complacency in the thing, and a sincerity which sufficiently argued he was not sorry for what he had done, that it was that violence which obliged him to desist from his design.

2. Among the multitude of persons who were proscribed under the second triumvirate of Rome, were the celebrated orator Cicero and his brother Quintus. The fate of the former, in endeavouring to make his escape, is related under the article CICERO. The latter found means to conceal himself so effectually at home, that the soldiers could not find him. Enraged at their disappointment, they put his son to the torture, in order to make him discover the place of his father's concealment; but filial affection was proof against the most exquisite torments. An involuntary sigh, and sometimes a deep groan, was all that could be extorted from the youth. His agonies were increased; but with amazing fortitude he still persisted in his resolution of not betraying his father. Quintus was not far off; and it may be imagined better than can be expressed, how his heart must have been affected with the sighs and groans of a son expiring in tortures to save his life. He could bear it no longer; but quitting the place of his concealment, he presented himself to the assassins, begging of them to put him to death, and dismiss the innocent youth, whose generous behaviour the triumvirs themselves, if informed of the fact, would judge worthy of the highest approbation. But the inhuman monsters, without being the least affected with the tears either of the father or the son, answered, that they both must die; the father because he was proscribed, and the son because he had concealed his father. Then a new contest of tenderness arose who should die first; but this the assassins soon decided, by beheading them both at the same time.—This anecdote is related by Appian, Dio, Plutarch, Valerius Maximus, and other historians.

3. Cinna, who scrupled no attempt, how atrocious soever, which could serve his purpose, undertook to get Pomponius Strabo murdered in his tent; but his son saved his life, which was the first remarkable action of Pompey the Great. The treacherous Cinna, by many alluring promises, had gained over one Terentius, a confidant of Pompey's, and prevailed on him to assassinate the general, and seduce his troops. Young Pompey

Filial.

Filial

Pompey being informed of this design a few hours before it was to be put in execution, placed a faithful guard round the prætorium; so that none of the conspirators could come near it. He then watched all the motions of the camp, and endeavoured to appease the fury of the soldiers, who hated the general his father, by such acts of prudence as were worthy of the oldest commanders. However, some of the mutineers having forced open one of the gates of the camp, in order to desert to Cinna, the general's son threw himself flat on his back in their way, crying out, that they should not break their oath and desert their commander, without treading his body to death. By this means he put a stop to their desertion, and afterwards wrought so effectually upon them by his affecting speeches and engaging carriage, that he reconciled them to his father.

Curtius.

4. Olympias, Alexander's own mother, was of such an unhappy disposition, that he would never allow her to have any concern in the affairs of the government. She used frequently to make very severe complaints on that account; but he always submitted to her ill-humour with great mildness and patience. Antipater, one of his friends, having one day written a long letter against her to the king then absent, the latter, after reading it, replied, "Antipater does not know that one single tear shed by a mother will obliterate ten thousand such letters as this." A behaviour like this, and such an answer, show at one and the same time, that Alexander was both an affectionate son and an able politician.

5. Epaminondas is universally acknowledged to have been one of the greatest generals and one of the best men which Greece ever produced. Before him the city of Thebes was not distinguished by any memorable action, and after him it was not famous for its virtues, but its misfortunes, till it sunk into its original obscurity; so that it saw its glory take birth and expire with this great man. The victory he obtained at Leuctra had drawn the eyes and admiration of all the neighbouring people upon Epaminondas, who looked upon him as the support of Thebes, as the triumphant conqueror of Sparta, as the deliverer of Greece: in a word, as the greatest man, and the most excellent captain, that ever was in the world. In the midst of this universal applause, so capable of making the general of an army forget the man for the victor, Epaminondas, little sensible to so affecting and so deserved a glory, "My joy (said he) arises from my sense of that which the news of my victory will give my father and my mother."

6. Among an incredible number of illustrious persons who were falsely accused and put to death by Nero, was one Barea Soranus; a man, as Tacitus informs us, of singular vigilance and justice in the discharge of his duty. During his confinement, his daughter Servilia was apprehended and brought into the senate, and there arraigned. The crime laid to her charge was, that she had turned into money all her ornaments and jewels, and the most valuable part of her dress, to defray the expence of consulting magicians. To this the young Servilia, with tears, replied, That she had indeed consulted magicians, but the whole of her inquiry was to know whether the emperor and senate would afford protection and safety to her dear

and indulgent parent against his accusers. "With this view (said she) I presented the diviners, men till now utterly unknown to me, with my jewels, apparel, and the other ornaments peculiar to my quality, as I would have presented my blood and life, could my blood and life have procured my father's liberty. But whatever this my proceeding was, my unfortunate father was an utter stranger to it; and if it is a crime, I alone am the delinquent." She was, however, together with her father, condemned to die; but in what manner, history is silent. [Vid. *Taciti Annales*, lib. 6. cap. 20.]

7. Valerius Maximus* likewise relates a very singular fact upon this subject. A woman of illustrious birth had been condemned to be strangled. The Roman prætor delivered her up to the triumvir, who caused her to be carried to prison, in order to her being put to death. The gaoler, who was ordered to execute her, was struck with compassion, and could not resolve to kill her. He chose therefore to let her die of hunger. Besides which, he suffered her daughter to see her in prison; taking care, however, that she brought her nothing to eat. As this continued many days, he was surprised that the prisoner lived so long without eating; and suspecting the daughter, upon watching her, he discovered that she nourished her mother with her own milk. Amazed at so pious, and at the same time so ingenious an invention, he told the fact to the triumvir, and the triumvir to the prætor, who believed the thing merited relating in the assembly of the people. The criminal was pardoned, and a decree was passed that the mother and daughter should be subsisted for the rest of their lives at the expence of the public.

The same author gives a similar instance of filial piety in a young woman named Xantippe to her aged father Cimonus, who was likewise confined in prison, and which is universally known by the name of the *Roman Charity*. Both these instances appeared so very extraordinary and uncommon to that people, that they could only account for them, by supposing that the love of children to their parents was the first law of nature. *Putaret aliquis (says our author) hoc contra naturam factum esse, nisi prima natura lex esset diligere parentes.*

In addition to the foregoing examples, we may refer to the article *ETNA*, n° 51. par. 3. where a very noble instance of filial piety is taken notice of. See also the article *PIETAS*.

FILIBEG, or FILLBEG. See FILLBEG.

FILICACIA (Vincent), a celebrated Italian poet, was born at Florence in 1642. He was a member of the Academy della Crusca and of that of the Arcadi, and became secretary to the duke of Tuscany. He died in 1707. His poems are much esteemed for the delicacy and nobleness of their sentiments. Scipio de Filicacia, his son, had them all printed together, under the title of *Poesie Fossiano di Vincenzo da Filicacia*, in 1707, 4to.

FILICES, (from *filum* "a thread," *quasi filatim incisa*), FERNS; one of the seven tribes or families of the vegetable kingdom, according to LINNÆUS, by whom it is thus characterized: "having their fructification on the back side of the frondes." They constitute the first order in the class cryptogamia; and consist of

Filial
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Filices.* Lib. v. 4
Plinii Hist.
lib. vii. 36

Filices
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Fillagree.

16 genera, which are divided into *fructificationes*, *spicatae*, *frondosae*, & *radicales*. This order comprehends the entire xvth class of Tournefort, in whose system the filices make only a single genus, in the first section of the above mentioned class.

FILICES, is also an order of plants in the *fragmenta methodi naturalis* of Linnæus. See BOTANY, p. 469. col. 2.

FILIGRANE, FILIGREE, or FILLAGREE, *Work*. See FILLAGREE.

FILING, one of the principal operations in smithery, &c. succeeding to forging. See FILE.

The coarser cut files are always to be succeeded by finer; and in all the kinds the rule is, to lean heavy on the file in thrusting it forward, because the teeth of the file are made to cut forwards. But in drawing the file back again for a second stroke, it is to be lightly lifted just above the work, by reason its cuts not coming back.

The rough or coarse-toothed file (which, when large, is called a *rubber*) serves to take off the unevennesses of the work left by the hammer in forging.

The bastard-toothed file is to take out too deep cuts, and file strokes made by the rough file. The fine-toothed file takes out the cuts or file-strokes the bastard file made; and the smooth file those left by the fine file.

In this order, the files of several cuts are to succeed each other till the work is as smooth as it can be filed. After which it may be made yet smoother with emery, tripoli, &c. See POLISHING.

FILIPENDULA, in botany. See SPIRÆA.

FILIX, in botany. See FILICES.

FILLAGREE, FILIGREE, or FILIGRANE, *work*, a kind of enrichment on gold or silver, wrought delicately, in manner of little threads or grains, or both intermixed. The word is compounded of *fil* or *filum* "thread," and *granum* "grain." In Latin it is called *filatim elaboratum opus, argentum, aurum*.

There is no manufacture in any part of the world, that has been more admired and celebrated, than the fine gold and silver fillagree of Sumatra. And what renders it a matter of greater curiosity is the coarseness of the tools employed in the workmanship, and which, in the hands of an European, would not be thought sufficiently perfect for the most ordinary purposes.—They are rudely and inartificially formed, by the goldsmith (*pandi*), from any old iron he can pick up. When you engage one of them to execute a piece of work, his first request is usually for a piece of iron hoop, to make his wire-drawing instrument; an old hammer head, stuck in a block, serves for an anvil; and a pair of compasses is often composed of two old nails tied together at one end. The gold is melted in a piece of a *precoo* or earthen rice-pot, or sometimes in a crucible of their own make, of ordinary clay. In general they use no bellows, but blow the fire with their mouths, through a joint of bamboo; and if the quantity of metal to be melted is considerable, three or four persons sit round their furnace, which is an old broken quallee or iron pot, and blow together. At Padang alone, where the manufacture is more considerable, they have adopted the Chinese bellows. Their method of drawing the wire differs but little from that

Fillagree,
Fillet.

used by European workmen. When drawn to a sufficient fineness, they flatten it by beating it on their anvil; and when flattened, they give it a twist like that in the whalebone handle of a punch-ladle, by rubbing it on a block of wood with a flat stick. After twisting they again beat it on the anvil, and by these means it becomes flat wire with indented edges. With a pair of nippers they fold down the end of the wire, and thus form a leaf, or element of a flower in their work, which is cut off. The end is again folded and cut off, till they have got a sufficient number of leaves, which are all laid on singly. Patterns of the flowers or foliage, in which there is not very much variety, are prepared on paper, of the size of the gold plate on which the fillagree is to be laid. According to this, they begin to dispose on the plate the larger compartments of the foliage, for which they use plain flat wire of a larger size, and fill them up with the leaves before mentioned. To fix the work, they employ a glutinous substance, made of the red hot berry called *bocu sago*, ground to a pulp on a rough stone. This pulp they place on a young cocoa-nut about the size of a walnut, the top and bottom being cut off. After the leaves have been all placed in order, and stuck on, bit by bit, a folder is prepared of gold-filings and borax, moistened with water, which they strew over the plate; and then putting it in the fire for a short time, the whole becomes united. This kind of work on a gold plate, they call *carrang papan*: when the work is open, they call it *carrang troufe*. In executing the latter, the foliage is laid out on a card, or soft kind of wood, and stuck on, as before described, with the sago berry; and the work, when finished, being strewed over with their folder, is put into the fire, when the card or soft wood burning away, the gold remains connected. If the piece be large, they folder it at several times. In the manufacture of badjoo buttons, they first make the lower part flat, and having a mould formed of a piece of buffalo's horn, indented to several sizes, each like one half of a bullet mould, they lay their work over one of these holes, and with a horn punch they press it into the form of the button. After this they complete the upper part. When the fillagree is finished, they cleanse it, by boiling it in water with common salt and alum, or sometimes lime juice; and in order to give it that fine purple colour which they call *sapo*, they boil it in water with brimstone. The manner of making the little balls with which their works are sometimes ornamented, is as follows. They take a piece of charcoal, and having cut it flat and smooth, they make in it a small hole, which they fill with gold dust, and this melted in the fire becomes a little ball. They are very inexpert at finishing and polishing the plain parts, hinges, screws, and the like, being in this as much excelled by the European artists, as these fall short of them in the fineness and minuteness of the foliage. The Chinese also make fillagree mostly of silver, which looks elegant, but wants likewise the extraordinary delicacy of the Malay work. The price of the workmanship depends upon the difficulty or uncommonness of the pattern. In some articles of usual demand, it does not exceed one third of the value of the gold; but in matters of fancy, it is generally equal to it.

FILLET, or FILET, in architecture, denotes a little

Fillet
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Filter.

little square member or ornament used in divers places and on divers occasions, but generally as a sort of corona over a greater moulding.

The fillet is the same with what the French call *reglet*, *bande*, and *bandelette*; the Italians *listra* or *listella*.

FILLET, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is supposed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak.

FILLET is also used for an ordinary drawn like the bar from the sinister point of the chief across the shield, in manner of a scarf; though it is sometimes also seen in the situation of a bend, fesse, cross, &c.

According to Guillim, the fillet is a fourth part of the chief, and is placed in the chief point of the escutcheon.

FILLET is also used among painters, gilders, &c. for a little rule or reglet of leaf-gold, drawn over certain mouldings; or on the edges of frames, pannels, &c. especially when painted white, by way of enrichment.

FILLETS, in the manege, are the loins of a horse, which begin at the place where the hinder-part of the saddle rests.

FILLY, a term among horse-dealers, to denote the female or mare colt.

FILM, a thin skin or pellicle. In plants, it is used for that thin, woody skin, which separates the seeds in the pods, and keeps them apart.

FILTER, or FILTRE, in chemistry, &c. a piece of woollen cloth, linen, paper, or other matter, some of which are in the form of hollow inverted cones, used to filtrate or strain liquors through. The filtre has the same use and effect with regard to liquids that the sieve or searce has in dry matters.

Filters are of two sorts. The first are simple pieces of paper or cloth, through which the liquor is passed without farther trouble. The second are twisted up like a skain or wick, and first wetted, then squeezed, and one end put in the vessel that contains the liquor to be filtrated; the other end is to be out, and hang down below the surface of the liquor; by means hereof the purest part of the liquor distils drop by drop out of the vessel, leaving the coarser part behind. This filter acts as a siphon.

FILTER is also a charm, supposed to have a virtue of inspiring love. The word is derived from *φιλεω*, amo "I love."

The Greeks, when their love was without success, had several arts to procure the affections of their beloved. The Thessalian women were famous for their skill in this as well as other magical practices. The means whereby it was effected were of divers sorts; it was sometimes done by potions called *φιλισρα*, which are frequently mentioned in authors of both languages. Juvenal speaks thus:

*Hic magicus affert cantus, hic Thessala vendit
Philtrea, quibus valeant mentem vexare mariti.*

Their operations were violent and dangerous, and commonly deprived such as drank them of their reason. Plutarch and Cornelius Nepos report, that Lucullus the Roman general first lost his reason, and afterwards his life, by one of them. Lucretius the poet ended his life by the same way; and Caius Caligula, as Suetonius reports, was driven into a fit of madness by a fil-

N^o 126.

ter given him by his wife Cæsonia, which story is mentioned by the same poet. Ovid likewise assures us, that this was the usual effect of such potions.

The ingredients they were made of were of various sorts; several of which applied by themselves were thought effectual.

FILTRATION, the act of passing any liquor through a filtre, called also *colature*, *percolation*, and *transcolation*. See FILTER, and CHEMISTRY, n^o 568.

FIMBRIÆ, *Fringes*. The extremities or borders of the tubæ Fallopianæ were formerly thus called; the word signifying a fringed border, which that part resembles.

FIMBRIATED, in heraldry, an ordinary with a narrow border or hem of another tincture.

FIN, in natural history, a well-known part of fishes, consisting of a membrane supported by rays, or little bony or cartilaginous ossicles.

The office of the fins has commonly been supposed to be analogous to that of feathers in fowls; and to assist the fish in its progressive motion, or swimming: but the later naturalists find this a mistake.

The tail is the great instrument of swimming: the fins only serve to keep the fish upright, and prevent vacillation or wavering. See ICHTHYOLOGY.

FINAL, in general, whatever terminates or concludes a thing; as *final* judgment, *final* sentence, &c.

FINAL Cause, is the end for which the thing is done. The final cause is the first thing in the intention of a person who does a thing; and the last in the execution. See CAUSE.

FINAL Letters, among the Hebrew grammarians, five letters so called, because they have a different figure at the end of words from what they have in any other situation.

FINAL, in geography, a port-town of Italy, subject to Genoa, and situated on the Mediterranean, about 37 miles south-west of that city. It was sold to the Genoese in 1713, by the emperor Charles VI. E. Long. 9. 12. N. Lat. 44. 30.

FINANCES, in the French policy, denote the revenues of the king and state: much the same with the treasury or exchequer of the English, and the fiscus of the Romans.—The word is derived from the German *finantz*, "scraping, usury." Though Du Cange chooses rather to deduce it from the barbarous Latin *financia*, *præstatio pecuniaria*.

Council of the FINANCES, corresponds to our lords-commissioners of the treasury: the comptroller-general of the finances, to our lord high treasurer, &c.

The French have a peculiar kind of figures, or numeral character, which they call *chiffre de finance*.

FINCH-KIND, in ornithology, an appellation given to a genus of birds known among authors by the name of FRINGILLA. See that article.

FINCH (Heneage), earl of Nottingham, the son of Sir Heneage Finch, some time recorder of London, and of a younger branch of the Winchelsea family, was born in 1621. By his good parts and diligence, he became a noted proficient in the municipal laws; was made solicitor-general by Charles II. on his restoration, and was very active in the prosecution of the regicides. In 1670, he was appointed attorney-general; about three years after, lord keeper of the great seal, on the removal of the earl of Shaftesbury; and lord chancellor in 1675. He was created earl of Nottingham

Filtration
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Finch.

Fine.

tingham in 1681; and died the year following, being quite worn out by the fatigues of business. He published several speeches on the trials of the judges of king Charles I. with some few other things; and left behind him Chancery Reports in MS.

FINE, that which is pure and without mixture. The term is particularly used in speaking of gold or silver.

FINE, in law, hath divers applications. Sometimes it is used for a formal conveyance of lands or tenements, or of any thing inheritable, being *in esse temporis finis*, in order to cut off all controversies. Others define it to be a final agreement between persons, concerning any lands or rents, &c. of which any suit or writ is depending between them in any court.

FINE, sometimes signifies a sum of money paid for entering lands or tenements let by lease; and sometimes a pecuniary mulct for an offence committed against the king and his laws, or against the lord of the manor.

FINES for Alienation, in feodal law. One of the attendants or consequences of tenure by vassalship. **KNIGHT-Service**, was that of fines due to the lord for every alienation, whenever the tenant had occasion to make over his land to another. This depended on the nature of the feodal connection; it not being reasonable nor allowed, that a feudatory should transfer his lord's gift to another, and substitute a new tenant to do the service in his own stead, without the consent of the lord: and, as the feodal obligation was considered as reciprocal, the lord also could not alienate his feignory without the consent of his tenant, which consent of his was called an *attornment*. This restraint upon the lord soon wore away; that upon the tenant continued longer. For, when every thing came in process of time to be bought and sold, the lords would not grant a licence to their tenants to aliene, without a fine being paid; apprehending that, if it was reasonable for the heir to pay a fine or relief on the renovation of his paternal estate, it was much more reasonable that a stranger should make the same acknowledgment on his admission to a newly purchased feud. In England, these fines seem only to have been exacted from the king's tenants *in capite*, who were never able to aliene without a licence: but as to common persons, they were at liberty, by *magna charta*, and the statute of *quia emptores* (if not earlier), to aliene the whole of their estate, to be holden of the same lord as they themselves held it of before. But the king's tenants *in capite*, not being included under the general words of these statutes, could not aliene without a licence: for if they did, it was in ancient strictness an absolute forfeiture of the land; though some have imagined otherwise. But this severity was mitigated by the statute 1 Edw. III. c. 12. which ordained, that in such case the lands should not be forfeited, but a reasonable fine be paid, to the king. Upon which statute it was settled, that one-third of the yearly value should be paid for a licence of alienation; but, if the tenant presumed to aliene without a licence, a full year's value should be paid. These fines were at last totally taken away by statute 12 Car. II. c. 24. See **KNIGHT-Service**.

FINE-Drawing, or **Rentering**, a dexterous sewing

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up or rejoining the parts of any cloth, stuff, or the like, torn or rent in the dressing, wearing, &c.

It is prohibited to *fine draw* pieces of foreign manufacture upon those of our own, as has formerly been practised. See **RENTING**.

FINE-Stiller, in the distillery. That branch of the art which is employed on the distilling the spirit from treacle or other preparations or recrements of sugar, is called *fine-stilling*, by way of distinction from malt-stilling; and the person who exercises this part of the trade is called a *fine-stiller*.

The operation in procuring the spirit from sugar is the same with that used in making the malt-spirit; a wash of the saccharine matter being made with water from treacle, &c. and fermented with yeast. It is usual to add in this case, however, a considerable portion of malt, and sometimes powdered jalap, to the fermenting backs. The malt accelerates the fermentation, and makes the spirit come out the cheaper, and the jalap prevents the rise of any musty head on the surface of the fermenting liquor, so as to leave a greater opportunity for the free access of the air, and thus to shorten the work, by turning the foamy into a hissing fermentation.

FINERS of GOLD and SILVER, are those who purify and part those metals from other coarser ones by fire and acids. They are also called *parters* in our old law-books, and sometimes *departers*.

FINERY, in the iron-works, is one of the two forges at which they hammer the sow or pig iron.

Into the finery they first put the pigs of iron, placing three or four of them together behind the fire, with a little of one end thrust into it; where, softening by degrees, they stir and work them with long bars of iron, and expose at different times different parts to the blast of the bellows, in order to refine it as equally as possible, till the metal runs together with a round mass or lump, which they call a *half bloom*. They then take this out, and give it a few strokes with their sledges; afterwards they carry it to a great heavy hammer, raised by the motion of a water-wheel; where, applying it dexterously to the blows, they presently beat it out into a thick short-square. This they put into the finery again, and heating it red-hot, they work it under the same hammer till it comes to be in the shape of a bar in the middle, but with two square knobs at the ends, which they call an *ancony*. It is then carried into the other forge called the *chaffry*.

FINEERING. See **VENEERING**.

FINESSE, a French term, of late current in English. Literally, it is of no farther import than our English *fineness*; but among us it is chiefly used to denote that peculiar delicacy or subtilty perceived in works of the mind, and the nicest and most secret and sublime parts of any science or art.

It is sometimes used to express that kind of subtilty made use of for the purposes of deception.

FINGAL, king of Morven, in ancient Caledonia. He flourished in the third century; and according to the Irish histories died in the year 283, although there is some reason from Ossian's poems for placing his death a few years later. Fingal was descended in all probability from those Celtic tribes who were the first inhabitants of Britain. Tradition, and the poems of

Fine

Fingal.

H h Ossian,

Blackst.
Comment.

Fingal.

Offian, give him a long line of royal ancestors, such as Combal, Trenmor, Trathal, &c. who had all reigned over the same territory. Whether this territory was bounded by the Caledonian forest, or extended somewhat farther to the south, towards the Roman province, is uncertain; but there is no doubt of its having extended over all the north and west Highlands, comprehending the Hebrides, whose petty chiefs were all subject to the king of Morven. His principal place of residence was Selma, which was probably in the neighbourhood of Glenco, supposed to be the Cona of Offian; though some imagine it to have been in Strath-Conan in Moray. The truth seems to be, that as Fingal and his people lived by hunting, they often shifted their habitation. Hence, in all parts of the Highlands we find, in the names of places, buildings, &c. such monuments as justify their several claims for the honour of Fingal's residence. Fingal acquired great fame by his prowess in arms. He made many successful incursions into the Roman province, from whence he carried away those spoils which his son so often mentions under the names of the *wine of the stranger*, and the *wax of the stranger*. By sea we find him frequently making voyages to Scandinavia, the Orkneys, and Ireland; called by Offian *Lochlin*, *Innisflore*, and *Ullin*. Several of these expeditions were celebrated by his son in epic poems, of which two only remain, Fingal and Temora. In the last of these poems, we find Fingal fighting together with his grandson Oscar. How long he lived afterwards is uncertain. He is said to have died a natural death; and therefore none of his son's poems relate to this event, though it is occasionally mentioned in many of them. "Did thy beauty last, O Ryno? Stood the strength of car-borne Oscar? Fingal himself passed away; and the halls of his fathers have forgot his steps. The blast of the north opens thy gates, O king, and I behold thee sitting on mist, dimly gleaming in all thine arms. Thy form now is not the terror of the valiant: but like a watery cloud, when we see the stars behind it, with their weeping eyes. Thy shield is like the aged moon; thy sword vapour half kindled with fire. Dim and feeble is the chief who travelled in brightness before—But thy steps are on the winds of the desert, and the storms darken in thy hand. Thou takest the sun in thy wrath, and hidest him in thy clouds. The sons of little men are afraid, and a thousand showers descend."—*Berrathon*.

"The character of Fingal (Dr Blair observes) is perhaps the most perfect that was ever drawn by a poet, for we may boldly defy all the writers of antiquity to show us any hero equal to Fingal. Throughout the whole of Offian's works, he is presented to us in all that variety of lights which give the full display of a character. In him concur almost all the qualities that can ennoble human nature; that can either make us admire the hero, or love the man. He is not only unconquerable in war, but he makes his people happy by his wisdom in the days of peace. He is truly the father of his people. He is known by the epithet of 'Fingal of the mildest look,' and distinguished on every occasion by humanity and generosity. He is merciful to his foes, full of affection to his children, full of concern about his friends, and never mentions Agandecca, his first love, without the utmost tender-

ness. He is the universal protector of the distressed; none ever went sad from Fingal.—'O Oscar! bend the strong in arms, but spare the feeble hand. Be thou a stream of many tides against the foes of thy people; but like the gale that moves the grass to those who ask thine aid: so Trenmor lived; such Trathal was; and such has Fingal been. My arm was the support of the injured; the weak rested behind the lightning of my steel.' These were the maxims of true heroism, to which he formed his grandson. His fame is represented as every where spread; the greatest heroes acknowledge his superiority; his enemies tremble at his name; and the highest encomiums that can be bestowed on one whom the poet would most exalt, is to say, That his soul was like the soul of Fingal. Wherever he appears, we behold the hero. The objects he pursues are always great; to bend the proud, to protect the injured, to defend his friends, to overcome his enemies by generosity more than by force. Some strokes of human imperfection and frailty are what usually give us the most clear view and the most sensible impression of a character, because they present to us a man such as we have seen; they recal known features of human nature. When poets go beyond this range, and attempt to describe a faultless hero, they, for the most part, set before us a sort of vague undistinguishable character, such as the imagination cannot lay hold of, or realize to itself as the object of affection. But Fingal, though exhibited without any of the common human failings, is nevertheless a real man; a character which touches and interests every reader."

We may observe, that Fingal appears to have been no less a poet than a warrior; at least, in all those passages ascribed to him in the poems of his son, there is a grandeur and loftiness that elevates them above the common style even of Offian. The following passage from the poem of *Carthon* may be taken as a specimen of Fingal's poetry.—"Raise, ye bards," said the mighty Fingal, 'the praise of unhappy Moina. Call her ghost, with your songs, to our hills; that she may rest with the fair of Morven, the sunbeams of other days, and the delight of heroes of old.—I have seen the walls of Balclutha, but they were desolate. The fire had refounded in the halls; and the voice of the people is heard no more. The stream of Clutha was removed from its place by the fall of the walls. The thistle shook, there, its lonely head: the moss whistled to the wind. The fox looked out from the windows; the rank grass of the wall waved round his head. Desolate is the dwelling of Moina: silence is in the house of her fathers. Raise the song of mourning, O bards, over the land of strangers. They have but fallen before us; for, one day we must fall.—Why dost thou build the hall, son of the winged days? Thou lookest from thy towers to day; yet a few years, and the blast of the desert comes; it howls in thy empty court, and whistles round thy half-worn shield.—And let the blast of the desert come! We shall be renowned in our day. The mark of my arm shall be in the battle, and my name in the song of bards. Raise the song; send round the shell: and let joy be heard in my hall. When thou, sun of heaven, shalt fail? if thou shalt fail, thou mighty light! if thy brightness is for a season, like Fingal; our fame shall survive thy beams.'—Such was the

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the joy of Fingal in the day of his joy. His thousand bards leaned forward from their seats, to hear the voice of the king. It was like the music of the harp on the gale of the spring. Lovely were thy thoughts, O Fingal! Why had not Ossian the strength of thy soul? But thou standest alone, my father; and who can equal the king of Morven?"

FINGERS, in anatomy, the extreme part of the hand divided into five members. See ANATOMY, n° 56.

FINING of LIQUORS. See CLARIFICATION.

FINISTERRE, the most westerly cape or promontory of Spain, in 10. 15. W. Long. and 43° N. Lat. This cape is likewise the most westerly part of the continent of Europe.

FINITE, something bounded or limited, in contradistinction to INFINITE.

FINLAND (the duchy of), is bounded on the west by the gulph of Bothnia, on the east by Muscovy, on the south by the gulph of Finland and Ingria, and on the north by Bothnia and Lapland. It is about 200 miles in length, and almost as much in breadth. It contains many lakes; in which are several islands, which are generally rocks or inaccessible mountains. The inhabitants are small of stature, capable of enduring hardships, and good soldiers. The Russians have for some time rendered themselves masters of a good part of this province; the rest belongs to Sweden. It is divided into seven provinces: 1. Finland; 2. Cajana; 3. Thavasthia; 4. Nyeland; 5. Savolaxia; 6. Carrelia; and, 7. Kexholmia.

Finland Proper is an agreeable country, and lies over-against the city of Stockholm, near the place where the gulphs of Bothnia and Finland meet. It is divided into South and North Finland. It is diversified with mountains, forests, lakes, meadows, and pleasant fields. The inhabitants salt the fish they do not consume themselves, and send it into foreign countries.

FINNINGIA, or FENNINGIA, (anc. geog.), the true reading for *Eningia* in Pliny, which he makes an island, but is more truly a peninsula. Now FINLAND, a province of Sweden. *Fenni*, or *Finni*, the people; whose ferocity was extraordinary, poverty extreme, herbs their food, skins their covering, and the ground their couch: regardless of man and of gods, they attained to a very difficult thing, not to have a single wish to form, (Tacitus.)

FIR TREE, in botany. See PINUS.

FIRE, in physiology, signifies that subtle invisible cause by which bodies are expanded or enlarged in bulk, and become hot to the touch; fluids are rarefied into vapour; solid bodies become fluid, and in like manner are at last dissipated, or if incapable of being carried off in vapour are at length melted into glass. It seems likewise to be the chief agent in nature on which animal and vegetable life have an immediate dependence, and without which it does not appear that nature itself could subsist a single moment.

The disputes concerning fire, which for a long time divided philosophers, have now in a great measure, though not wholly, subsided. The celebrated philosophers of the last century, Bacon, Boyle, and Newton, were of opinion, that fire was no distinct substance from other bodies, but that it consisted entirely in the violent motion of the parts of any body. As no motion, however, can be produced without a cause, they

were obliged to have recourse to a mechanical force or impulse as the ultimate cause of fire in all cases. Thus Boyle tells us, that when a piece of iron becomes hot by hammering, "there is *nothing* to make it so, except the forcible motion of the hammer impressing a vehement and variously determined agitation on the small parts of the iron." Bacon defines *heat*, which he makes synonymous with fire, to be "an expansive undulatory motion in the minute particles of a body, whereby they tend with some rapidity from a centre towards a circumference, and at the same time a little upwards." Sir Isaac Newton said nothing positive upon the subject; but conjectured that gross bodies and light might be convertible into one another; and that great bodies of the size of our earth when violently heated, might continue and increase their heat by the mutual action and reaction of their parts.

But while the mechanical philosophers thus endeavoured to account for the phenomena of fire upon the same principles which they judged sufficient to explain those of the universe in general, the chemists as strenuously asserted that fire was a fluid of a certain kind, distinct from all others, and universally present throughout the whole globe. Boerhaave particularly maintained this doctrine; and in support of it brought the following argument, that steel and flint would strike fire, and produce the very same degree of heat in Nova Zembla which they would do under the equator. Other arguments were drawn from the increased weight of metalline calces, which they supposed to proceed from the fixing of the element of fire in the substance whose weight was thus increased. By these experiments Mr Boyle himself seems to have been staggered; as he published a treatise on the possibility of making fire and flame ponderable; though this was directly contrary to his own principles already quoted. For a long time, however, the matter was most violently disputed; and the mechanical philosophers, though their arguments were equally inconclusive with those of their adversaries, at last prevailed through the prejudice in favour of Sir Isaac Newton, who indeed had scarce taken any active part in the contest.

That the cause of fire cannot be any mechanical motion which we can impress, is very evident; because on mechanical principles an effect must always be proportionable to the cause. In the case of fire, however, the effect is beyond all calculation greater than the cause, supposing the latter to be only a mechanical percussion, as in the case of hammering iron till it be red hot. By a few strokes of an hammer, the particles of a piece of iron, we shall allow, may be set in a violent motion, and thus produce fire. If, however, we direct the motion of these particles upon another body whose parts are at rest, and in some degree coherent, it is plain that the latter will resist and diminish the motion of the particles already moved, in proportion to their *vis inertia*, as well as the cohesion of the parts of the second body, if indeed we can suppose the *vis inertia* of matter to be different from the effect of gravitation, cohesion, or some other power acting upon it. By no argumentation whatever, then, can we show upon mechanical principles, why fire should have such a tendency to increase and multiply itself without end, as we see it has, even abstracting from all consideration of the necessity of air for continuing the action of fire.

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The action of the air in augmenting and continuing the power of fire, seems scarce at all to have been considered by those who first undertook an investigation of the subject. It evidently gave rise to the Hutchinsonian hypothesis, that fire, light, and air, were convertible into one another. This, however, is equally untenable with the mechanical hypothesis: for later discoveries have shown, that our atmosphere is composed of two distinct fluids, only one of which is fit for supporting flame; and if we should suppose this to be the only proper air, it is in like manner demonstrated, that this pure fluid is not homogeneous, but composed of a gravitating and non-gravitating substance; the latter of which only has the properties of fire: so that this element is still as invisible as ever; nor can it be shown by any experiment that *fire per se* has ever been changed into a palpable or gravitating substance.

The experiments which first seemed to bring this dispute to a decision were those of Dr Black, concerning what he called *latent heat*; on which some other names, such as *absolute heat*, *specific fire*, &c. have been bestowed, very little to the advancement of science in general. From these discoveries it appears, that fire may exist in bodies in such a manner as not to discover itself in any other way than by its action upon the minute parts of the body; but that suddenly this action may be changed in such a manner as no longer to be directed upon the particles of the body itself, but upon external objects: in which case we then perceive its action by our sense of feeling, or discover it by the thermometer, and call it *sensible heat*. This expression, it must be owned, is improper; and the use of the word *heat*, instead of *fire*, has produced some confusion, which it is not now easy to avoid in speaking on these subjects. By the word *heat*, we ought always to understand the effect of fire, or the fluid acting in a certain manner, rather than the mere element itself; which, it is certain, from the experiments just mentioned, may exist in substances actually *cold* to the touch.

From this discovery made by Dr Black, along with many others in electricity, and recorded at length in various articles of this work, it is now almost universally allowed, that fire is a distinct fluid capable of being transferred from one body to another. But when this was discovered, another question no less perplexing occurred, viz. what kind of a fluid it was; or whether it bears any analogy to those with which we are better acquainted? Here we find two fluids, viz. the solar light, and the electric matter, both of which occasionally act as fire, and which therefore seem likely to be all the same at bottom. By the vulgar, indeed, the matter has long ago been determined; and the rays of the sun as well as the electrical fluid have been promiscuously denominated *elementary fire*. Philosophers, indeed, have withheld their assent; though their reasons for so doing are by no means apparent. The most strange suppositions, however, have been made concerning the nature of both those fluids, and on the most slender grounds imaginable; or rather, on no grounds at all, they have been supposed to be phlogiston itself, or to contain a large proportion of it. Mr Scheele went so far in this way as to form an hypothesis, which he endeavoured to support by some

experiments, that fire is composed of dephlogisticated air and phlogiston. But it is now ascertained beyond all possibility of dispute, that the result of such a combination is not fire, but fixed air: so that we need not take any farther notice of this hypothesis than just to observe, that it would have been altogether untenable, even though this discovery had not been made; because the dephlogisticated air itself is not a simple but a compound substance, as has already been observed; and that in all cases of combustion the one part of the air is separated from the other.

It was long ago observed by Sir Isaac Newton, that heat was certainly conveyed by a medium more subtle than the common air; because two thermometers, one included in the vacuum of an air-pump, the other placed in the open air, at an equal distance from the fire, would grow equally hot in nearly the same time. The consequence of this, had he pursued the thought, was, that fire itself was equally present in all places, and as active where there was no terrestrial matter as where there was. New improvements in the air-pump have enabled succeeding philosophers to make more perfect vacuums, such as it has been supposed even the electric matter cannot pass through. It is not to be doubted, however, that, even there, the thermometer would be heated by a fire as well as in the open air. Fire, therefore, exists and acts where there is no other matter, and of consequence is a fluid *per se*, independent of every terrestrial substance, without being generated or compounded of any thing we are yet acquainted with. To determine the nature of the fluid, we have only to consider whether any other can be discovered which will pass through the perfect vacuum just mentioned, and act there as fire. Such a fluid we find in the solar light, which is well known to act even *in vacuo* as the most violent fire. The solar light will likewise act in the very same manner in the most intense cold; for M. de Saussure has found, that on the cold mountain-top the sun-beams are equally, nay more powerful, than on the plain below. It appears, therefore, that the solar light will produce heat independent of any other substance whatever; that is, where no other body is present, at least as far as we can judge, except the light itself, and the body to be acted upon. We cannot therefore avoid concluding, that a certain modification of the light of the sun is the cause which produces heat, expansion, vapour, &c. and answers to the rest of the characters given in our definition of fire, and that independent of any other substance whatever.

Under the article ELECTRICITY, Sect. vi. we have endeavoured to show that the electric matter is no other than the light of the sun absorbed by the earth, and thus becoming subject to new laws, and assuming many properties apparently different from what it has when it acts as light. Even in this case it manifests its identity with fire or light, viz. by producing a most intense heat where a large quantity of it passes through a small space. *In vacuo*, indeed, we cannot manage it in such a manner as to make the proof decisive. But though this must be accounted a defect, it never can amount to any positive proof that electricity and fire are different. We see that in some cases they produce the very same effects; and if they do not so in all, we ought rather to account for the difference from the variation of circumstances, and our want of knowledge or abilities

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ties to make proper experiments, than to multiply elements without any necessity, when one is evidently capable of answering all the purposes of nature. At any rate, the experiments which have already been made, and the proofs adduced from the phenomena of nature, show such a strong affinity between the elements of fire, light, and electricity, that we may not only assert their identity upon the most probable grounds, but lay it down as a position against which no argument of any weight has an existence at present. For a further discussion of this subject, see CHEMISTRY, Part I. Sect. i. ELECTRICITY, Sect. vi. HEAT, FLAME, FLUIDITY, &c.

Wild FIRE, a kind of artificial or factitious fire, which burns even under water, and that with greater violence than out of it.

It is composed of sulphur, naphtha, pitch, gum, and bitumen; and is only extinguishable by vinegar mixed with sand and urine, or by raw hides.

Its motion or tendency is said to be contrary to that of natural fire, and always follows the direction in which it is thrown; whether it be downwards, sideways, or otherwise. The French call it *Greek fire*, or *feu Gregeois*, because first used by the Greeks, about the year 660; as is observed by the Jesuit Petavius, on the authority of Nicetas, Theophanes, Cedrenus, &c.

The inventor, according to the same Jesuit, was an engineer of Heliopolis, in Syria, named *Callinicus*, who first applied it in the sea-fight commanded by Constantine Pogonates against the Saracens, near Cyzicus, in the Hellespont; and with such effect, that he burnt the whole fleet therewith, wherein were 30,000 men. But others will have it of a much older date; and hold Marcus Gracchus the inventor: which opinion is supported by several passages both in the Greek and Roman writers, which shows it to have been anciently used by both these nations in their wars.

Constantine's successors used it on divers occasions with equal advantage as himself; and what is remarkable enough is, that they were so happy as to keep the secret of the composition to themselves, so that no other nation knew it in the year 960.

Hugh king of Burgundy, demanding ships of the emperor Leo, for the siege of Frefne, desired likewise the Greek fire.

F. Daniel gives us a good description of the Greek fire in his account of the siege of Damietta under St Louis. Every body, says that author, was astonished with the Greek fire, which the Turks then prepared; and the secret whereof is now lost. They threw it out of a kind of mortar; and sometimes shot it with an odd sort of cross-bow, which was strongly bent by means of a handle or winch, of much greater force than the mere arm. That thrown with the mortar sometimes appeared in the air of the size of a tun, with a long tail, and a noise like that of thunder. The French by degrees got the secret of extinguishing it; in which they succeeded several times.

Machine for Preserving from FIRE. This machine consists of a pole, a rope, and a basket. The pole is of fir, or a common scaffold pole, of any convenient length from 36 to 46 feet; the diameter at bottom, or greatest end, about five inches; and at the top, or smallest end, about three inches. At three feet from the top is a mortise through the pole, and a pulley fixed to it of nearly the same diameter with the pole in that

part. The rope is about three quarters of an inch diameter, and twice the length of the pole, with a spring hook at one end, to pass through the ring in the handle of the basket when used: it is put through the mortise over the pulley, and then drawn tight on each side to near the bottom of the pole, and made fast there till wanted. The basket should be of strong wicker-work, three feet and a half long, two feet and a half wide, rounded off at the corners, and four feet deep, rounding every way at the bottom. To the top of the basket is fixed a strong iron curve or handle, with an eye or ring in the middle; and to one side of the basket, near the top, is fixed a small cord, or guide-rope, of about the length of the pole. When the pole is raised, and set against a house over the window from which any persons are to escape, the manner of using it is so plain and obvious, that it needs not be described. The most convenient distance from the house for the foot of the pole to stand, where practicable, is about 12 or 14 feet. If two strong iron straps, about three feet long, rivetted to a bar cross, and spreading about 14 inches at the foot, were fixed at the bottom of the pole, this would prevent its turning round or slipping on the pavement. And if a strong iron hoop, or ferule, rivetted (or welded) to a semicircular piece of iron spreading about 12 inches, and pointed at the ends, were fixed on at the top of the pole, it would prevent its sliding against the wall.

When these two last mentioned irons are fixed on, they give the pole all the steadiness of a ladder; and because it is not easy, except to persons who have been used to it, to raise and set upright a pole of 40 feet or more in length, it will be convenient to have two small poles or spars of about two inches diameter, fixed to the sides of the great pole at about two or three feet above the middle of it, by iron eyes rivetted to two plates, so as to turn every way; the lower end of these spars to reach within a foot of the bottom of the great pole, and to have ferules and short spikes to prevent sliding on the pavement, when used occasionally to support the great pole like a tripod. There should be two strong ash trundles let through the pole, one at four feet and one at five feet from the bottom, to stand out about eight inches on each side, and to serve as handles, or to twist the rope round in lowering a very heavy weight. If a block and pulley were fixed at about the middle of the rope, above the other pulley, and the other part of the rope made to run double, it would diminish any weight in the basket nearly one-half, and be very useful in drawing any person up, to the assistance of those in the chambers, or for removing any effects out of a chamber, which it might be dangerous to attempt by the stairs.

It has been proved, by repeated trials, that such a pole as we have been speaking of can be raised from the ground, and two or three persons taken out of the upper windows of an house, and set down safely in the street, in the space of 35 seconds, or a little more than half a minute. Sick and infirm persons, women, children, and many others, who cannot make use of a ladder, may be safely and easily brought down from any of the windows of an house on fire by this machine, and, by putting a short pole through the handles of the basket, may be removed to any distance without being taken out of the basket. The pole must always have the

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Fire. the rope ready fixed to it, and may be conveniently laid up upon two or three iron hooks under any shade or gate-way, and the basket should be kept at the watch-house. When the pole is laid up, the two spars should always be turned towards the head of it. The basket should be made of peeled rods, and the pole and spars painted of a light stone-colour, to render it more visible when used in the night.

Machines for extinguishing FIRE. In the year 1734, the state of Sweden offered a premium of 20,000 crowns for the best method of stopping the progress of accidental fires; when one Mr Fuchs, a German physician, made a preparation for that end, and the experiment was made on a house built on purpose, of dry fir, at Legard island. In the building were placed several tubs of tar and pitch, and a great quantity of chips, all which were set on fire; flames issuing through the top of the house, windows, &c. when he threw in one of the barrels containing the preparation, which immediately quenched the flames; a second barrel entirely cleared the smoke away; and the whole was executed to the satisfaction of the spectators, and to the no small satisfaction of the inventor, who was about to return home, when unexpectedly the flames broke out again, supposed to be occasioned by a small quantity of combustible matter being introduced and set on fire secretly by some malicious person. Upon this the wrong-headed mob fell upon Mr Fuchs, and beat him most unmercifully, so that he narrowly escaped with his life. He soon after left the country, and never could be prevailed on (though strongly persuaded by some of the most eminent citizens) to return. It is said, another experiment of the same kind was tried in the year 1761 in Holland; but rendered abortive through the perverseness of the populace.

Attempts of a similar nature have met with a better reception in England. Of these the most successful was that of Mr Godfrey, whose contrivance is thus described by Mr Ambrose Godfrey, grandson to the inventor. "The machine to be employed consists of a small portion of gunpowder closely confined; which, when animated by fire, acts by its elastic force upon a proper medium, and not only divideth it into the minutest atoms, but disperseth it also in every direction, so as immediately to extinguish any fire within a certain distance. This medium is a liquor strongly impregnated with a preparation of antiphlogistic principles, which by their action upon burning materials extinguish the flames, and reduce them in general to the state of a black coal; and, by its opposite nature to fire, hinders the remaining sparks, notwithstanding the admission of the air, from kindling the flames afresh. By this means, the great point is obtained, in giving sufficient time for totally extinguishing any remains of fire.

"They who presume that water only will perform this will find themselves greatly mistaken, as the draught of air will certainly rekindle the neighbouring materials, which are very fit to receive a fresh flame, the fire not being extinguished by the quantity of water, but rather by the expansion and rarefaction of its particles. There are several sizes of these machines, from five to fifty pounds weight, in a portable and rather small compass, and may generally be carried to any place where a man can go himself.

"But though these machines will prevent great fires

by a timely application, they will not extinguish them after they have reached a frightful height, and several houses, perhaps near a whole street, are in flames. The floors must be standing, and access to the building safe, otherwise no person can be supposed to approach near enough to apply them in a proper manner. Every fire has its beginning for the most part in some apartment; and, as soon as discovered, the family, instead of losing all presence of mind, should immediately apply one or more of these machines, which will then fully answer the intention. The proper time of applying them, supposes that they are ready at hand. It will be in vain to think of fetching them from any considerable distance, as it will then be too late for them to perform any important service; except indeed being the probable means of saving some adjacent house, by extinguishing the flames as often as they break out, till the building first on fire is totally consumed, and, by falling into ruins, leaves the other in perfect safety."

On the 19th of May 1761, at noon, Mr Godfrey's experiment for extinguishing fire, was tried in an house erected for that purpose, near Mary-le-bon. Their royal highnesses the duke of York, prince William Henry, prince Henry Frederic, a great number of persons of rank and distinction, and many of the learned world, gave their attendance on this singular occasion. The house, which is of brick, consists of three rooms one above another, a stair-case, chimney, lath-and-plaster ceilings, and a kind of wainscoting round the rooms, of rough deal. Exactly at 12 o'clock the ground room, and that up one pair of stairs, were set on fire, by lighting the faggots and shavings laid in there for that purpose: in about 15 minutes the wainscot of the under room was thought to be sufficiently in flames, and three of the machines were thrown in; which, by almost immediate and sudden explosions, instantaneously extinguished the flames, and the very smoke in that apartment in a few minutes totally disappeared. By this time, the firemen, &c. who had the care of throwing in the machines, gave an alarm that the stair-case had taken fire, and that it was necessary directly to go to work upon the next room; which was accordingly done, and with the same effect. The experiment, however, hitherto did not universally satisfy: in the last instance especially it was thought to be too hastily put in execution; and the populace without-side the paling, who were supposed to amount to near 20,000, and whose curiosity, from the very nature of their situation, remained much dissatisfied, began to grow rather riotous, and talked of a second bottle-conjuror. For the sake of the experiment, therefore, and to remove all manner of doubt, Mr Godfrey consented to a third experiment in the upper room, which was entirely of wood. The flames were now suffered to get to a considerable height, and even the window-frames destroyed, before the machines were thrown in: which, however, answered exactly as the former had done; and, being quite in sight of the out-standers, met with universal approbation.

These machines of Mr Godfrey's, it is evident, would be of great use in extinguishing fires on shipboard; and might be considered as a no less necessary part of a ship's lading, than her stores or ammunition.

The hint of these machines is said to have been taken by Dr Godfrey from the invention of one Zachary Grey,

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Fire. Grey, who exhibited machines similar to those of Dr Godfrey, before persons of the first rank, but without meeting with any encouragement. His machines were made of wood, and the liquor employed was only water, and consequently inferior to Dr Godfrey's in its power of extinguishing fire. The latter is said to have mixed his water with a certain quantity of oil of vitriol, or with sal ammoniac. These machines, however, as already observed, are found to be only serviceable in the beginning of a fire. When the roof had fallen in, they had no effect.

Water-Engine for Extinguishing FIRE. See HYDRO-STATICS, n° 33.

In using this machine we have the following improvement by Dr Hoffman, which promises to be of great efficacy. As soon as the engine is in readiness to work, stir into the water that immediately is to be discharged, seven or eight pounds of pearl-ashes in powder, and continue to add it in this manner as occasion requires; taking care that it be directed against the timber or wainscot, &c. just beginning to burn, and not wasted against the brickwork: or, where time will admit, dissolve any quantity of pearl-ashes in a copper with water, and as fast as it dissolves, which will be in a few minutes, mix a pail full with the water in the engine, pretty often; and whatever burning wood it is played upon, will be extinguished as if it was dipped in water, and will not burn afresh in the part extinguished.

Easy Method of Extinguishing FIRE in Chimneys. It is well known, that the inner parts of chimneys easily take fire; the foot that kindles therein emits a greater flame, according as the tunnel is more elevated, because the inferior air feeds the fire. If this air could therefore be suppressed, the fire would soon be extinguished. In order to this, some discharge a pistol into the chimney, which produces no effect: others lay under the chimney a copper full of water; but the vapours that rise from it, far from extinguishing the fire, seem to give it new force. Water thrown into the chimney at top is equally of no effect, because it comes down through the middle of the tunnel, and not along the sides! It would be more advisable to stop with dung the upper orifices of the tunnel for quenching the fire. But the surest and readiest method is, to take a little gunpowder, and having humected it with spittle for binding it, to form it into small masses, and so throw it into the heart of the chimney. When it is burnt, and has produced a considerable vapour, a second, afterwards a third, are thrown, and so on, as much as is necessary. In a little time the fire is extinguished, and, as it were, choaked by this vapour; and cakes of inflamed foot are seen to fall from the tunnel, till at last not the least vestige of fire appears.

Securing Buildings against FIRE. Dr Hales proposes to check the progress of fires by covering the floors of the adjoining houses with earth. The proposal is founded on an experiment which he made with a fir-board half an inch thick, part of which he covered with an inch depth of damp garden mould, and then lighted a fire on the surface of the mould; though the fire was kept up by blowing, it was two hours before the board was burnt through, and the earth prevented it from flaming. The thicker the earth is laid on the floors, the better: however, Dr Hales apprehends that the depth of an inch will generally be sufficient; and

he recommends to lay a deeper covering on the stairs, because the fire commonly ascends by them with the greatest velocity.

M. Hartley made several trials in the years 1775 and 1776, in order to evince the efficacy of a method which he had invented for restraining the spread of fire in buildings. For this purpose thin iron plates are well nailed to the tops of the joists, &c. the edges of the sides and ends being lapped over, folded together, and hammered close. Partitions, stairs, and floors, may be defended in the same manner; and plates applied to one side have been found sufficient. The plates are so thin as not to prevent the floor from being nailed on the joists, in the same manner as if this preventative were not used: they are kept from rust by being painted or varnished with oil and turpentine. The expence of this addition, when extending through a whole building, is estimated at about 5 per cent. Mr Hartley has a patent for this invention, and parliament has voted a sum of money towards defraying the expence of his numerous experiments. The same preservative may also be applied to ships, furniture, &c.

Lord Mahon has also discovered and published a very simple and effectual method of securing every kind of building against all danger of fire. This method he has divided into three parts, viz. under-flooring, extra-lathing, and inter-securing.

The method of underflooring is either single or double. In single underflooring, a common strong lath of oak or fir, about one-fourth of an inch thick, should be nailed against each side of every joist, and of every main timber, supporting the floor which is to be secured. Other similar laths are then to be nailed along the whole length of the joists, with their ends butting against each other. The top of each of these laths or fillets ought to be at $1\frac{1}{2}$ inch below the top of the joists or timbers against which they are nailed; and they will thus form a sort of small ledge on each side of all the joists. These fillets are to be well bedded in a rough plaster hereafter mentioned, when they are nailed on, so that there may be no interval between them and the joists; and the same plaster ought to be spread with a trowel upon the tops of all the fillets, and along the sides of that part of the joists which is between the top of the fillets and the upper edge of the joists. In order to fill up the intervals between the joists that support the floor, short pieces of common laths, whose length is equal to the width of these intervals, should be laid in the contrary direction to the joists, and close together in a row, so as to touch one another: their ends must rest upon the fillets, and they ought to be well bedded in the rough plaster, but are not to be fastened with nails. They must then be covered with one thick coat of the rough plaster, which is to be spread over them to the level of the tops of the joists: and in a day or two this plaster should be trowelled over close to the sides of the joists, without covering the tops of the joists with it.

In the method of double-flooring, the fillets and short pieces of laths are applied in the manner already described; but the coat of rough plaster ought to be little more than half as thick as that in the former method. Whilst this rough plaster is laid on, some more of the short pieces of laths above mentioned must be laid in the intervals between the joists upon the first

coat,

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coat, and be dipped deep in it. They should be laid as close as possible to each other, and in the same direction with the first layer of short laths. Over this second layer of short laths there must be spread another coat of rough plaster, which should be trowelled level with the tops of the joists without rising above them. The rough plaster may be made of coarse lime and hair; or, instead of hair, hay chopped to about three inches in length may be substituted with advantage. One measure of common rough sand, two measures of slacked lime, and three measures of chopped hay, will form in general a very good proportion, when sufficiently beat up together in the manner of common mortar. The hay should be put in after the two other ingredients are well beat up together with water. This plaster should be made stiff; and when the flooring boards are required to be laid down very soon, a fourth or fifth part of quicklime in powder, formed by dropping a small quantity of water on the limestone a little while before it is used, and well mixed with this rough plaster, will cause it to dry very fast. If any cracks appear in the rough plaster-work near the joists when it is thoroughly dry, they ought to be closed by washing them over with a brush wet with mortar-wash: this wash may be prepared by putting two measures of quicklime and one of common sand in a pail, and stirring the mixture with water till the water becomes of the consistence of a thin jelly.

Before the flooring boards are laid, a small quantity of very dry common sand should be strewed over the plaster-work, and struck smooth with an hollow rule, moved in the direction of the joists, so that it may lie rounding between each pair of joists. The plaster-work and sand should be perfectly dry before the boards are laid, for fear of the dry rot. The method of under-flooring may be successfully applied to a wooden stair-case; but no sand is to be laid upon the rough plaster-work. The method of extra-lathing may be applied to ceiling joists, to sloping roofs, and to wooden partitions.

The third method, which is that of inter-securing, is very similar to that of under-flooring; but no sand is afterwards to be laid upon it. Inter-securing is applicable to the same parts of a building as the method of extra-lathing, but it is seldom necessary.

Lord Mahon has made several experiments in order to demonstrate the efficacy of these methods. In most houses it is only necessary to secure the floors; and the extra-expence of under-flooring, including all materials, is only about nine pence per square yard, and with the use of quicklime a little more. The extra-expence of extra-lathing is no more than six pence per square yard for the timber side-walls and partitions; but for the ceiling about nine pence per square yard. But in most houses no extra-lathing is necessary.

FIRE-Eater. We have a great number of mountebanks who have procured the attention and wonder of the public by eating of fire, walking on fire, washing their hands in melted lead, and the like tricks.

The most celebrated of these was our countryman Richardson, much talked of abroad. His secret, as related in the *Journal des Sçavans*, of the year 1680, consisted in a pure spirit of sulphur, wherewith he rubbed his hands, and the parts that were to touch the fire;

N^o 127.

which burning and cauterising the epidermis, hardened and enabled the skin to resist the fire.

Indeed, this is no new thing: Amb. Paré assures us he had tried it on himself; that after washing the hands in urine, and with unguentum aureum, one may safely wash them in melted lead.

He adds also, that by washing his hands in the juice of onions, he could bear a hot shovel on them while it melted lead.

FIRE, in theology. See *HELL*.

We read of the sacred fire in the first temple of Jerusalem, which came down from heaven: it was kept with the utmost care, and they were forbidden to carry any strange fire into the temple. This fire is one of the five things which the Jews confess were wanting in the second temple.

The pagans had their sacred fires, which they kept in their temples with the most religious care, and which were never to be extinguished. Numa was the first who built a temple to Fire as a goddess, at Rome, and instituted an order of priestesses for the preservation of it. See *VESTALS*.

Fire was the supreme god of the Chaldeans; the Magi were worshippers of fire; and the Greeks and Armenians still keep up a ceremony called the *holy fire*, upon a persuasion that every Easter-day a miraculous fire descends from heaven into the holy sepulchre, and kindles all the lamps and candles there.

FIRE kindled spontaneously in the Human Body. See *Extraordinary Cases of BURNING*.

FIRE-Barrel. See *FIRE-Ship*, Note (B).

FIRE-Bavins. Ibid. Note (D).

FIRE-Arrow, in naval artillery, is a small iron dart furnished with springs and bars, together with a match impregnated with sulphur and powder, which is wound about its shaft. It is intended to fire the sails of the enemy, and is for this purpose discharged from a musketoon or swivel-gun. The match being kindled by the explosion, communicates the flame to the sail against which it is directed, where the arrow is fastened by means of its bars and springs. This weapon is peculiar to hot climates, particularly the West Indies, where the sails being extremely dry by reason of the great heats, they instantly take fire, and of course set fire to the masts and rigging, and lastly to the vessel itself.

FIRE-Ball, in artillery, a composition of meal-powder, sulphur, salt-petre, pitch, &c. about the bigness of a hand-grenade, coated over with flax, and primed with the slow composition of a fuze. This is to be thrown into the enemy's works in the night-time, to discover where they are; or to fire houses, galleries, or blinds of the besiegers; but they are then armed with spikes or hooks of iron, that they may not roll off, but stick or hang where they are desired to have any effect. See *FIRE-BALLS*, and *Light-BALLS*.

Balls of FIRE, in meteorology, a kind of luminous bodies generally appearing at a great height above the earth, with a splendor surpassing that of the moon; and sometimes equalling her apparent size. They generally proceed in this hemisphere from north to south with vast velocity, frequently breaking into several smaller ones, sometimes vanishing with a report, sometimes not.

These luminous appearances no doubt constitute one part of the ancient prodigies, blazing stars or comets, which

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which last they sometimes resemble in being attended with a train; but frequently they appear with a round and well defined disk. The first of these of which we have any accurate account, was observed by Dr Halley and some other philosophers at different places, in the year 1719. From the slight observations they could take of its course among the stars, the perpendicular height of this body was computed at about 70 miles from the surface of the earth. The height of others has also been computed, and found to be various; though in general it is supposed to be beyond the limits assigned to our atmosphere, or where it loses its refractive power. The most remarkable of these on record appeared on the 18th of August 1783, about nine o'clock in the evening. It was seen to the northward of Shetland, and took a southerly direction for an immense space, being observed as far as the southern provinces of France, and one account says that it was seen at Rome also. During its course it appears frequently to have changed its shape; sometimes appearing in the form of one ball, sometimes of two or more; sometimes with a train, sometimes without one. It passed over Edinburgh nearly in the zenith, and had then the appearance of a well defined round body, extremely luminous, and of a greenish colour; the light which it diffused on the ground giving likewise a greenish cast to objects. After passing the zenith it was attended by a train of considerable length, which continually augmenting, at last obliterated the head entirely; so that it looked like a wedge, flying with the obtuse end foremost. The motion was not apparently swift, by reason of its great height; though in reality it must have moved with great rapidity, on account of the vast space it travelled over in a short time. In other places its appearance was very different. At Greenwich we are told, that "two bright balls parallel to each other led the way, the diameter of which appeared to be about two feet; and were followed by an expulsion of eight others, not elliptical, seeming gradually to mutilate, for the last was small. Between each two balls a luminous ferrated body extended, and at the last a blaze issued which terminated in a point. Minute particles dilated from the whole. The balls were tinted first by a pure bright light, then followed a tender yellow, mixed with azure, red, green, &c.; which, with a coalition of bolder tints, and a reflection from the other balls, gave the most beautiful rotundity and variation of colours that the human eye could be charmed with. The sudden illumination of the atmosphere, and the form and singular transfiguration of this bright luminary, tended much to make it awful: nevertheless the amazing vivid appearance of the different balls, and other rich connective parts not very easy to delineate, gave an effect equal to the rainbow in the full zenith of its glory."

Dr Blagden, in a paper on this subject in the 74th volume of the Philosophical Transactions, has not only given a particular account of this and other meteors of the kind, but added several conjectures relating to the probable causes of them. The first thing which occurred to philosophers on this subject was, that the meteors in question were burning bodies rising from the surface of the earth, and flying along the atmosphere with great rapidity. But this hypothesis was soon abandoned, on considering that there was no power known by which such bodies could either be

raised to a sufficient height, or projected with the velocity of the meteors. The next hypothesis was, that they do not consist of one single body, but of a train of sulphureous vapours, extending a vast way through the atmosphere, and being kindled at one end, display the luminous appearances in question by the fire running from one end of the train to the other. To this hypothesis, which was invented by Dr Halley, Dr Blagden objects that no just explanation is given of the nature of the vapours themselves, the manner in which they are raised up, or in which they can be regularly arranged in straight lines of such vast extent; or how they can be supposed to burn in such rarefied air. "Indeed, (says he) it is very difficult to conceive how vapours could be prevented, in those regions where there is in a manner no pressure, from spreading out on all sides in consequence of their natural elasticity, and instantly losing that degree of density which seems necessary for inflammation. Besides, it is to be expected, that such trains would sometimes take fire in the middle, and thus present the phenomenon of two meteors at the same time, receding from one another in a direct line."

For these and other reasons this hypothesis of Dr Halley was abandoned, and another substituted in its place. This was, that the meteors we speak of are permanent solid bodies, not rising from the earth, but revolving round it in very eccentric orbits, and thus in their perigee moving with inconceivable rapidity. But the Doctor shows, that even on this supposition, the velocity of such bodies must scarce be one third of that with which fire-balls move, and which has been calculated at upwards of 1000 miles per minute. The hypothesis is likewise liable to a number of other objections which cannot be answered, particularly from the variations in their appearance; for it is impossible to show in what manner one solid and permanent body could assume the appearance of eight or ten, as was the case with the meteor of 1783; nor can it be shown why a body, which in passing over Edinburgh appeared with a disk evidently less than that of the sun, should, in passing over Greenwich, assume the appearance of two bodies, each of which had a disk considerably larger than the apparent disk of that luminary. To obviate, in some measure, objections of this kind, it has been supposed that the revolving bodies are surrounded by a kind of electrical atmosphere by which they are rendered luminous; "but (says the Doctor) I think, whoever carefully peruses the various accounts of fire-balls, and especially ours of the 18th of August, when it divided, will perceive that their phenomena do not correspond with the idea of a solid nucleus involved in a subtle fluid, any more than with the idea of another learned gentleman, that they become luminous by means of a contained fluid, which occasionally explodes through the thick solid outer shell."

Another hypothesis, which Dr Blagden has not mentioned, is, that the meteors in question are a kind of bodies which take fire as soon as they come within the atmosphere of the earth. But this cannot be supposed without implying a previous knowledge of these bodies, which it is altogether impossible we can have. The only opportunity we have of seeing them is when they are on fire. Before that time they are in an invisible and unknown state; and it is surely improper to ar-

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gue concerning them in this state, or pretend to determine any one of their properties, when we have it not in our power to see or investigate them in the least. As the meteors therefore never manifest themselves to our senses but when they are on fire, the only rational conclusion we can draw from thence is, that they have no existence in any other state; and consequently that their substance must be composed of that fluid which, when acting after a certain manner, becomes luminous and shows itself as fire; remaining invisible and eluding our researches in every other case. On this hypothesis we must conclude that the fire-balls are great bodies of electric matter, moving from one part of the heavens where, to our conception, it is superabundant, to another where it is deficient. This opinion is adopted by Dr Blagden for the following reasons:

1. On account of their prodigious velocity, which is not less than 1200 miles in a minute, and seems incompatible with any other substance we know besides the electric fluid. "This (says he) is perhaps the only case in which the course or direction of that fluid is rendered perceptible to our senses, in consequence of the large scale on which these meteors move."

2. Various electrical phenomena have been observed to attend them, such as lambent fires settling upon men, horses, &c. and sparks coming from them, "or the whole meteor itself (adds our author), it is said, have damaged ships, houses, &c. after the manner of lightning." This last circumstance, however, we can believe only of another kind of fire-balls, of which we shall afterwards treat, which keep at a small distance from the earth, or run along its surface; for the great meteors of which we now speak, flying at the distance of 50 or 60, or more miles from the surface of the earth, cannot be less from their apparent size than a mile or a mile and an half in diameter. Such an immense body of electric matter descending on the earth, would by its explosion ruin a large tract of country; and there is no probability that when engendered in such a rare atmosphere it could break through the whole body of gross and dense air which lies between these regions and the earth, and which we know resists the passage of the electric fluid very strongly. Notwithstanding this, there is no impossibility that the atmosphere may be electrified to a great degree by such a meteor passing over it; and thus electrical appearances may attend these bodies without any actual emission of their substance, as Dr Blagden supposes. "If there be really (says he) any hissing noise heard while the meteors are passing, it seems explicable on no other supposition than that of streams of electric matter issuing from them, and reaching the earth with a velocity equal to that of the meteor, namely, in two or three seconds. Accordingly, in one of our late meteors, the hissing was compared to that of electricity issuing from a conductor. The sparks flying off so perpetually from the body of fire-balls may possibly have

some connection with these streams. In the same manner the sound of explosions may perhaps be brought to us quicker than if it were propagated to us by the air alone. Should these ideas be well founded, the change of direction, which meteors seem at times to undergo, may possibly be influenced by the state of the surface of the earth over which they are passing, and to which the streams are supposed to reach. A similar cause may occasion the apparent explosion, the opening of more channels giving new vent and motion to the electric fluid. May not the deviation and explosion which appear to have taken place in the fire-ball of the 18th of August over Lincolnshire, have been determined by its approach towards the fens, and an attraction produced by that large body of moisture?"

The explosion mentioned by our author over Lincolnshire does not seem to have been the only one which happened during the course of this meteor. Several people heard reports after it had vanished; and these were sometimes single and sometimes double. At Edinburgh two reports were heard, the one immediately following the other, at the distance of six or seven minutes after the meteor had passed. These reports no doubt indicated a temporary dissolution of the body; but it is by no means probable that the dissolution could have taken place either on account of the state of the earth or atmosphere. We must consider that both earth and atmosphere are always full of electric fluid; and if there happens to be what is called a *deficiency* (A) in one of them, the other instantly supplies it. It is impossible, therefore, that either the earth or atmosphere could receive such an immense additional quantity in one part without a vent being provided for it somewhere else. In thunder-storms we naturally conclude that vast quantity of electrical matter is put in motion; but from the effects of lightning it appears that this quantity must be very trifling in comparison with what the meteor we now speak of contained. A violent flash of lightning has been known to perforate a looking-glass, and make only a hole of about an inch diameter. Now we have no reason to suppose that the flash, tremendous as it might appear to our eyes, was any other than an electric spark of an inch in diameter. The meteor, on the other hand, appears not to have been less than a mile in diameter; so that the disproportion betwixt it and a single flash of lightning appears almost beyond calculation; and we may reasonably conclude that it could not have been equalled by 10,000 thunder-storms. Had this amazing body of electric fire descended through the atmosphere and dissipated itself on the fens of Lincolnshire, it must have produced the most violent and unheard of effects, not only in that place, but probably throughout the whole island. Its dissipation must therefore have been in the higher regions, where there was ample space to receive it; and where its explosion, whatever concussion it might make among the ethereal matter itself, could not affect our earth or atmosphere in any remarkable

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(A) A real deficiency can never happen with regard to the electric fluid in any substance whatever, as is shown at large under the article *ELECTRICITY*, as well as many others in this work. What seems a deficiency is only when the fluid has a tendency to circulate. In this case, as the motion must begin in one place and return from another, the place where it begins seems to be deficient, because the fluid is going away from it; while that from which it returns seems, for a similar reason, to have too much.

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3. Another argument adduced by Dr Blagden in favour of the electrical origin of fire-balls, is their connection with the aurora borealis, and the resemblance they bear to these phenomena, which are now almost universally allowed to be electrical. "Instances (says he) are recorded, where northern lights have been seen to join, and form luminous balls, darting about with great velocity, and even leaving a train behind them like the common fire-balls. This train I take to be nothing else but the rarefied air left in such an electrified state as to be luminous; and some streams of the northern lights are very much like it." The aurora borealis appears to occupy as high, if not a higher region above the surface of the earth, as may be judged from the very distant countries to which it has been visible at the same time: indeed the great accumulation of electric matter seems to lie beyond the verge of our atmosphere, as estimated by the cessation of twilight. Also with the northern lights a hissing noise is said to be heard in some very cold climates: Gmelin speaks of it in the most pointed terms, as frequent and very loud in the north-eastern parts of Siberia*; and other travellers have related similar facts."

* See Aurora Borealis.

4. Our author thinks that the strongest argument for the electrical origin of these meteors is the direction of their course, which is constantly either from the north or north-west quarter of the heavens, or towards it; or, as our author thinks, nearly in the direction of the magnetical meridian. Such a course, however, seems only to belong to the very large fire-balls of which we now speak; the smaller ones, called *Falling Stars*, being moved in all directions; "perhaps (says the Doctor), because they come further within the verge of our atmosphere, and are thereby exposed to the action of extraneous causes. That the smaller sort of meteors, such as shooting stars, are really lower down in the atmosphere, is rendered very probable by their swifter apparent motion: perhaps it is this very circumstance which occasions them to be smaller, the electric fluid being more divided in more resisting air. But as those masses of electric matter which move where there is scarce any resistance, so generally affect the direction of the magnetic meridian, the ideas which have been entertained of some analogy between these two obscure powers of nature seem not altogether without foundation. If the foregoing conjectures be just, distinct regions are allotted to the electrical phenomena of our atmosphere. Here below we have thunder and lightning, from the unequal distribution of the electric fluid among the clouds; in the loftier regions, whither the clouds never reach, we have the various gradations of falling stars; till, beyond the limits of our corpuscular atmosphere, the fluid is put into motion in sufficient masses, to hold a determined course, and exhibit the different appearances of what we call *fire-balls*; and probably at a still greater elevation above the earth, the electricity accumulates in a lighter and less condensed form, to produce the wonderfully diversified streams and coruscations of the aurora borealis."

The paper from whence these extracts are taken was written before Mr Morgan's account of the non-conducting power of a perfect vacuum made its appearance. An abstract of his arguments on this subject is given under the article *ELECTRICITY*, n° 130—137. and their insufficiency to prove the point intended, is shown under the same article, n° 277. Under that article, we have only mentioned the deficiency in Mr Morgan's argument, without adducing any positive proof to the contrary. Such a proof, however, is offered by the meteor in question, or by others of the same nature. Dr Halley, speaking of the fire-ball of 1719, the height of which he calculated at very little less than 70 miles, expresses his surprise that sound should be propagated through a medium near 300,000 times rarer than the common air, and the next thing to a perfect vacuum. Now it remains, and for ever will remain, to be proved, that Mr Morgan's most perfect vacuum, formed by boiling quicksilver in a tube ever so long, contains a medium more than 300,000 times rarer than the common atmosphere. From Mr Cavallo's experiments* it appears, that when air is only rarefied 1000 times, the electric light is excessively weak; so that there is not the least probability that in an aerial medium 300,000 times rarer than the present, if indeed such a medium can exist, there could be any light made visible in the ordinary experiments. We see, however, by the many examples of meteors which have occurred at prodigious heights in the atmosphere, that the electric light in such a rarefied atmosphere is not only visible, but acts as vigorously in every respect as if it were on the surface of the earth. This circumstance therefore affords a complete demonstration of the fallacy of Mr Morgan's argument, and a direct proof that the electric fluid pervades space as completely divested of air as the best artificial vacuum we can make; nay, where it is generally believed by mathematicians that the atmosphere has ceased altogether. His other arguments drawn *a priori* are still more inconclusive than that we have just mentioned. He tells us, that if a vacuum was a conductor, the whole quantity of electric matter contained in the earth and atmosphere would be perpetually flying off through the regions of infinite space, as being surrounded by a boundless conductor. But even this does not follow, though we should suppose these regions to be an absolute vacuity; for we know that electricity does not fly to a conducting substance merely because it is a conductor, but because it opens a passage to some place whither it has a tendency to go though the conductor was not there. Now, on the present hypothesis, as the conductor would lead to no place to which the electric matter had any previous tendency, we cannot assign any reason why it should acquire a tendency to fly off merely on account of the neighbourhood of a conductor, even though boundless. His other objection (that, on the supposition of a vacuum being capable of conducting electricity, the whole space in the universe would be filled with electric fluid) may be admitted in its fullest extent, without any detriment whatever to science: and indeed, if we allow the electric fluid to be only a modification of the light of the sun, as is rendered very probable under the article *ELECTRICITY*, sect. vi. as well as that of *FIRE*, and many others in various places of this

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* See *Electricity*, n° 142.

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work, we must own that the whole universe is filled with it. The meteors in question then will be no other than discharges of electricity from one part of the celestial spaces to another, similar to the discharges between the positive and negative side of an electrified bottle; thus intimating, that a circulation has taken place in the fluid, which the meteor at once completes and puts an end to. See the article METEOROLOGY.

Besides these already just mentioned of such vast magnitude, there are others much smaller and nearer the surface of the earth, rolling upon it, or falling upon it, exploding with violence, as is the case with those which appear in the time of thunder, and frequently produce mischievous effects. One of these is mentioned by some authors as falling in a serene evening in the island of Jamaica; exploding as soon as it touched the surface of the ground, and making a considerable hole in it. Another is mentioned by Dr Priestley as rolling along the surface of the sea, then rising and striking the top-mast of a man of war, exploding, and damaging the ship. In like manner we hear of an electrified cloud at Java in the East Indies; whence, without any thunder-storm, there issued a vast number of fire-balls, which did incredible mischief. This last phenomenon points out to us the true origin of balls of this kind, viz. an excessive accumulation of electricity in one part, or a violent tendency to circulate, when at the same time the place where the motion begins is at so great a distance, or meets with other obstacles of such a nature, that it cannot easily get thither. Urged on, however, by the vehement pressure from behind, it is forced to leave its place; but being equally unable to displace the great quantity of the same fluid, which has no inclination to move the same way with itself, it is collected into balls, which run hither and thither, according as they meet with conductors capable of leading them, into some part of the circle. This is even confirmed by an experiment related at the end of Dr Priestley's fifth volume on Air. He relates, that a gentleman having charged, with a very powerful machine, a jar, which had the wire supporting the knob of a considerable length, and passed through a glass-tube, a globe of fire was seen to issue out of it. This globe gradually ascended up the glass-tube till it came to the top of the knob, where it settled, turning swiftly on its axis, and appearing like a red-hot iron ball of three quarters of an inch diameter. On continuing to turn the machine, it gradually descended into the jar; which it had no sooner done, than there ensued a most violent explosion and flash, the jar being discharged and broken at the same time. This experiment, however, is singular in its kind; for neither the gentleman who performed it, nor any other, has yet been able to repeat it. Single as it is, however, we may yet gather from it, that a fire-ball will be the consequence of a very violent electrification of any substance, provided at the same time that the air be in a very non-conducting state, so that the electricity may not evaporate into it as fast as it is collected; for this would produce only lucid streams and flashes, as in the common experiments with the Leyden phial: and it is probably an inattention to this circumstance which has hitherto prevented the repetition of the experiment above-men-

tioned. The case is the same in thunder-storms, where an excessive accumulation of electric matter always produces fire-balls, the most mischievous kind of lightning, as is explained under that article.

With regard to the uses which fire-balls serve in the system of nature, it is plain that they are the means of preserving the equilibrium in the electric fluid in the atmosphere, which would otherwise produce the most dreadful tempests. Under the article *AURORA Borealis*, it is shown why there must be a constant current of electric matter through the bowels of the earth from the equator to the poles, and from the poles to the equator through the atmosphere. The great meteors serve for keeping up the equilibrium in this great atmospheric current, while the smaller ones answer a like purpose in the general mass of electric matter dispersed over the surface of the earth, and therefore are seen to move in all directions; as the equilibrium happens to require them in different parts. With regard to those which are observed in the lower regions of the earth, or rolling on the surface of the ground itself, they undoubtedly answer purposes of a similar kind in these lower regions; for as fire-balls in general are produced by a great excess of electricity in one place, there must of course be an equal deficiency in another; and to restore the equilibrium, or, to speak more properly, to prevent a dangerous commotion from taking place throughout the whole mass of electric fluid, the fire-ball breaks forth, and either puts a stop at once to the disturbance by an explosion, or by a silent and invisible evaporation. From some accounts indeed it would seem that even the large celestial meteors detached part of their substance to accomplish this purpose; though, for the reasons already given, it would seem more probable that they operated by electrifying the atmosphere, or setting the fluid contained in it in motion, so as to produce small fire-balls of itself, rather than by detaching any part of their own bodies to such a distance. Dr Blagden, in the paper above quoted, gives an account of an appearance of this kind. It was described in a letter to Sir Joseph Banks from the Abbé Mann, director of the academy at Brussels. "It happened (says the Abbé) at Mariekercke, a small village on the coast, about half a mile west of Ostend. The curate of the village was sitting in the dusk of the evening with a friend, when a sudden light surprised them, and, immediately after a small ball of light-coloured flame came through a broken pane of glass, crossed the room where they were sitting, and fixed itself on the chink of a door opposite to the window where it entered, and there died gradually away. It appeared to be a kind of phosphoric light carried along by the current of air. The curate and his friend, greatly surprised at what they saw, apprehended fire in the neighbourhood; but going out, found that the fire which had come in through the window had been detached from a large meteor in its passage."

FIRE-COCKS. Churchwardens in London and within the bills of mortality, are to fix fire-cocks at proper distances in streets, and keep a large engine and hand-engine for extinguishing fire, under the penalty of 10l. stat. 6 Ann. c. 31.

On the breaking out of any fire in London or Westminster, the constables and beadles of parishes shall repair

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Fire. pair to the place with their staves, and assist in extinguishing it, and cause the people to work for that end, &c.

FIRE-Engine. See *STEAM-Engine*.

FIRE-Flair, in ichthyology. See *RAJA*.

FIRE-Flies, a species of flies common in Guiana, of which there are two species. The largest is more than an inch in length, having a very large head connected with the body by a joint of a particular structure, with which at some times it makes a loud knock, particularly when laid on its back. The fly has two feelers or horns, two wings, and six legs. Under its belly is a circular patch, which, in the dark, shines like a candle; and on each side of the head near the eyes is a prominent, globular, luminous body, in size about one-third larger than a mustard seed. Each of these bodies is like a living star, emitting a bright, and not small, light; since two or three of these animals, put into a glass-vessel, afford light sufficient to read without difficulty, if placed close to the book. When the fly is dead, these bodies will still afford considerable light, tho' it is less vivid than before; and if bruised, and rubbed over the hands or face, they become luminous in the dark, like a board smeared over with English phosphorus. They have a reddish-brown or chestnut colour; and live in rotten trees in the day, but are always abroad in the night. The other kind is not more than half as large as the former: their light proceeds from under their wings, and is seen only when they are elevated, like sparks of fire appearing or disappearing at every second. Of these the air is full in the night, tho' they are never seen in the day. They are common not only in the southern, but in the northern parts of America, during the summer.

FIRE-Lock, or *Fusil*, a small gun which fires with a flint. It is distinguished from an old musket, or match-lock, which was fired with a match. The fire-lock is now in common use in the European armies.

FIRE-Philosophers, or *Philosophi per ignem*, a fanatical sect of philosophers who appeared towards the close of the 16th century, and made a figure in almost all the countries of Europe. The distinguishing tenet from which they derived this appellation was, that the intimate essences of natural things were only to be known by the trying efforts of fire, directed in a chemical process. They were also called *Theosophists*, from their declaring against human reason as a dangerous and deceitful guide, and representing a divine and supernatural illumination as the only means of arriving at truth: they were likewise denominated *Paracelsists*, from the name of Paracelsus, the eminent physician and chemist, who was the chief ornament and leader of this extraordinary sect. It was patronised in England by Robert Flood or Fludd, who endeavoured to illustrate the philosophy of Paracelsus in a great number of treatises; in France, it was zealously propagated by Rivier; in Denmark, by Severinus; in Germany, by Kunrath, an eminent physician of Dresden; and in other countries by warm and successful votaries, who assumed a striking air of piety and devotion, and proposed to themselves no other end than the advancement of the divine glory, and the restoration of peace and concord in a divided church: accordingly they were joined by several persons eminent for their piety, and distinguished by their zeal for the advancement of

true religion. One of the most celebrated of these was Daniel Hoffman, professor of divinity in the university of Helmstadt, who, availing himself of some unguarded passages in the writings of Luther, extravagantly maintained, that philosophy was the mortal enemy of religion; that truth was divisible into two branches, the philosophical and theological; and that what was true in philosophy was false in theology. Hoffman was afterwards obliged, by the interposition of Henry Julius, duke of Brunswick, to retract his invectives against philosophy, and to acknowledge in the most open manner the harmony and union of sound philosophy with true and genuine theology.

FIRE-Places are contrivances for communicating heat to rooms, and also for answering various purposes of art and manufacture. See *CHIMNEY*, *FURNACE*, and *STOVE*.

The late ingenious Dr Franklin, having recounted the inconveniences and advantages of fire-places in common use, proposes a new contrivance for this purpose, called the *Pennsylvania fire-place*. 1. This machine consists of a bottom-plate or hearth-piece (see fig. 1.) with a rising moulding before for a fender, two perforated ears *F, G*, for receiving two screw-rods; a long air-hole *aa*, through which the outward air passes into an air-box; and three smoke-holes represented by dark squares in *BC*, thro' which the smoke descends and passes away; besides, double ledges for receiving between them the lower edges of the other plates. 2. A back plate without holes, and furnished with a pair of ledges to receive, 3. The two side-plates, each of which has a pair of ledges to receive the side-edges of the front plate, with a shoulder on which it rests; two pair of ledges to receive the side-edges of the two middle plates which form the air-box, and an oblong air-hole near the top, through which the air warmed in the box is discharged into the room, and a wing or bracket as *H*, and a small hole as *R*, for the axis of the register to turn in. See fig. 2. which represents one of these plates. 4. An air-box, composed of the two middle plates *DE* and *FG*, fig. 3. and 4. The first has five thin ledges or partitions cast on it, the edges of which are received into so many pair of ledges cast in the other: the tops of all the cavities formed by these thin deep ledges are also covered by a ledge of the same form and depth cast with them; so that when the plates are put together, and the joints luted, there is no communication between the air-box and the smoke. In the winding passages of this box, fresh air is warmed as it passes into the room. 5. A front-plate, which is arched on the under side, and ornamented with foliages, &c. 6. A top plate, with a pair of ears *M, N*, (fig. 5.) answerable to those in the bottom plate, and perforated for the same purpose. It has also a pair of ledges running round the under side to receive the top edges of the front, back, and side plates. The air-box does not reach up to the top-plate by $2\frac{1}{2}$ inches.

All these plates are of cast iron; and when they are all in their proper places, they are bound firmly together by a pair of slender rods of wrought iron with screws, and the machine appears as in fig. 5. There are also two thin plates of wrought iron, viz. 7. The shutter, which is of such a length and breadth as to close well the opening of the fire-place, and serving to blow

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blow up the fire, and to secure it in the night. It is raised or depressed by means of two brass knobs, and slides in a groove left between the foremost ledge of the side plates and the face of the front plate. 8. The register, which is placed between the back plate and air-box, and furnished with a key; so that it may be turned on its axis, and made to lie in any position between level and upright. The operation of this machine, and the method of fixing it, may be understood by observing the profile of the chimney and fire-places in fig. 6. *M* is the mantle-piece or breast of the chimney; *C* the funnel; *B* the false back, made of brick-work in the chimney, four inches or more from the true back, from the top of which a closing is to be made over to the breast of the chimney, that no air may pass into the chimney except that which goes under the false back, and up behind it; *E* the true back of the chimney; *T* the top of the fire-place; *F* the front of it; *A* the place where the fire is made; *D* the air-box; *K* the hole in the side plate, thro' which the warmed air is discharged out of the air-box into the room; *H* the hollow, formed by removing some bricks from the hearth under the bottom plate filled with fresh air, entering at the passage *I*, and ascending into the air-box through the air-hole in the bottom plate near *G*, the partition in the hollow, designed to keep the air and smoke apart; *P* the passage under the false back, and part of the hearth for the smoke; and the arrows in the figure show the course of the smoke. The fire being made at *A*, the flame and smoke will ascend, strike the top *T*, and give it a considerable heat; the smoke will turn over the air-box, and descend between it and the back plate to the holes near *G* in the bottom plate, heating in its passage all the plates of the machine; it will then proceed under and behind the false back, and rise into the chimney. The air of the room contiguous to the several plates, and warmed by them, becomes specifically lighter than the other air in the room, and is obliged to rise; but being prevented by the closure over the fire-place from going up the chimney, is forced out into the room, and rising by the mantle-piece to the ceiling, is again driven down gradually by the stream of newly-warmed air that follows; and thus the whole room becomes in a little time equally warmed. The air also, warmed under the bottom plate and in the air-box, rises and comes out of the holes in the side plates, and thus warming and continually changing the air of the room. In the closing of the chimney a square opening for a trap-door should be left for the sweeper to go up: the door may be made of slate or tin, and so placed, that by turning up against the back

of the chimney when open, it closes the vacancy behind the false back, and shoots the foot that falls in sweeping out upon the hearth. It will also be convenient to have a small hole, about five or six inches square, cut near the ceiling thro' into the funnel, and provided with a shutter; by occasionally opening which, the heated air of the room and smoke of tobacco, &c. may be carried off without incommoding the company. For a farther account of the manner of using this fire-place, the advantages attending it, answers to objections, and directions to the brick-layer in fixing it, the curious reader may consult Franklin's Letters and Papers on Philosophical Subjects, p. 284—318. edit. 1769.

FIRE-Pots, in the military art, small earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered; then the pot is covered with a piece of parchment, and two pieces of match across lighted: this pot being thrown by a handle of matches where it is designed, it breaks and fires the powder, and burns all that is near it, and likewise fires the powder in the grenade, which ought to have no fuse, to the end its operations may be the quicker.

FIRE-Reeds. See the next article, Note (c.)

FIRE-Ship, an old vessel filled with combustible materials, and fitted with grappling irons to hook, and set fire to, the enemies ships in battle, &c.

As there is nothing particular in the construction of this ship, except the apparatus by which the fire is instantly conveyed from one part to another, and from thence to the enemy, it will be sufficient to describe the fire-room, where these combustibles are enclosed, together with the instruments necessary to grapple the ship intended to be destroyed.

The fire-room is built between decks, and limited on the after part by a *bulk-head*, *L*, behind the main-mast, from which it extends quite forward, as represented in Plate CXCIH. The train inclosed in this apartment is contained in a variety of wooden troughs, *D, G*, which intersect each other in different parts of the ship's length; being supported at proper distances by cross-pieces and stanchions. On each side of the ship are six or seven ports, *H*, about 18 inches broad and 15 inches high; and having their lids to open downward, contrary to the usual method.

Against every port is placed an iron chamber (*A*), which, at the time of firing the ship, blows out the port-lid, and opens a passage for the flame. Immediately under the main and fore-shrouds is fixed a wooden funnel *M*; whose lower end communicates with a fire-barrel (*B*), by which the flame passing thro' the

(A) The iron-chambers are 10 inches long and 3.5 in diameter. They are breeched against a piece of wood fixed across the ports, and let into another a little higher. When loaded, they are almost filled with corn-powder, and have a wooden tampion well driven into their muzzles. They are primed with a small piece of quick-match thrust through their vents into the powder, with a part of it hanging out. When the ports are blown open by means of the iron-chambers, the port-lids either fall downward, or are carried away by the explosion.

(B) The fire-barrels ought to be of a cylindrical form, as most suitable to contain the reeds with which they are filled, and more convenient for stowing them between the troughs in the fire-room. Their inside chambers should not be less than 21 inches, and 30 inches is sufficient for their length. The bottom parts are first well stored with

the funnel is conducted to the shrouds. Between the funnels, which are likewise called *fire-trunks*, are two scuttles, or small holes in the upper deck, serving also to let out the flames. Both funnels must be stopped with plugs, and have sail-cloth or canvas nailed close over them, to prevent any accident happening from above to the combustibles laid below.

The ports, funnels, and scuttles, not only communicate the flames to the outside and upper-works of the ship and her rigging; but likewise open a passage for the inward air, confined in the fire-room, which is thereby expanded so as to force impetuously through those out-lets, and prevent the blowing up of the decks, which must of necessity happen from such a sudden and violent rarefaction of the air as will then be produced.

On each side of the bulk-head behind is cut a hole *L*, of sufficient size to admit a trough of the same dimensions as the others. A leading trough, *L I*, whose foremost end communicates with another trough within the fire-room, is laid close to this opening, from whence it extends obliquely to a sally-port *I*, cut thro' the ship's side. The decks and troughs are well covered with melted rosin. At the time of the firing either of the leading troughs, the flame is immediately conveyed to the opposite side of the ship, whereby both sides burn together.

The spaces *N, O*, behind the fire-room, represent the cabins of the lieutenant and master, one of which is on the starboard, and the other on the larboard side. The captain's cabin, which is separated from these by a bulk-head, is exhibited also by *P*.

Four of the eight fire-barrels are placed under the

four fire-trunks; and the other four between them, two on each side the fire-scuttles, where they are securely cleated to the deck. The longest reeds (*c*) are put into the fore and aft troughs, and tied down: the shortest reeds are laid in the troughs athwart, and tied down also. The bavons (*d*), dipped at one end, are tied fast to the troughs over the reeds, and the curtains are nailed up to the beams, in equal quantities, on each side of the fire-room.

The remainder of the reeds are placed in a position nearly upright, at all the angles of every square in the fire-room, and there tied down. If any reeds are left, they are to be put round the fire-barrels, and other vacant places, and there tied fast.

Instructions to prime.

TAKE up all your reeds, one after another, and strow a little composition at the bottom of all the troughs under the reeds, and then tie them gently down again: next strow composition upon the upper part of the reeds throughout the fire-room; and upon the said composition lay double quick-match upon all the reeds, in all the troughs: the remainder of the composition strow over all the fire-room, and then lay your bavons loose.

Cast off all the covers of the fire-barrels, and hang the quick-match loose over their sides, and place leaders of quick-match from the reeds into the barrels, and from thence into the vent of the chambers, in such a manner as to be certain of their blowing open the ports, and setting fire to the barrels. Two troughs of communication from each door of the fire-room to the sally-ports, must be laid with a strong leader of quick-match,

with short double-dipped reeds placed upright; and the remaining vacancy is filled with fire-barrel composition well mixed and melted, and then poured over them. The composition used for this purpose is a mass of sulphur, pitch, tar, and tallow.

There are five holes, of three-fourths inch in diameter and three inches deep, formed in the top of the composition while it is yet warm; one being in the centre, and the other four at equal distances round the sides of the barrel. When the composition is cold and hard, the barrel is primed by filling those holes with fuse-composition, which is firmly driven into them, so as to leave a little vacancy at the top to admit a strand of quick-match twice doubled. The centre-hole contains two strands at their whole length, and every strand must be driven home with mealed powder. The loose ends of the quick-match being then laid within the barrel, the whole is covered with a dipped curtain, fastened on with a hoop that slips over the head of the barrel, to which it is nailed.

The barrels should be made very strong, not only to support the weight of the composition before firing, when they are moved or carried from place to place, but to keep them together whilst burning: for if the staves are too light and thin, so as to burn very soon, the remaining composition will tumble out and be dissipated, and the intention of the barrels, to carry the flame aloft, will accordingly be frustrated.

The curtain is a piece of coarse canvas, nearly a yard in breadth and length, thickened with melted composition, and covered with saw-dust on both sides.

(*c*) The reeds are made up in small bundles of about a foot in circumference, cut even at both ends, and tied together in two places. They are distinguished into two kinds, viz. the long and short; the former of which are four feet, and the latter two feet five inches in length. One part of them are singly dipped, i. e. at one end: the rest are dipped at both ends in a kettle of melted composition. After being immersed about seven or eight inches in this preparation, and then drained, they are sprinkled over with pulverised sulphur upon a tanned hide.

(*d*) The bavons are made of birch, heath, or other brush-wood, which is tough and readily kindled. They are usually two or three feet in length, and have all their bush-ends lying one way, the other ends being tied together with small cords. They are dipped in composition at the bush-ends, whose branches are afterwards confined by the hand, to prevent them from breaking off by moving about; and also to make them burn more fiercely. After being dipped in the same manner as the reeds, they also are sprinkled with sulphur.

Fire.

match, four or five times double: also a cross-piece to go from the sally-port, when the ship is fired, to the communication trough, laid with leaders of quick-match, that the fire may be communicated in both sides at once.

What quick-match is left place so that the fire may be communicated to all parts of the room at once, especially about the ports and fire-barrels, and see that the chambers are well and fresh primed. [N. B. The port-fire used for firing the ship, burns about 12 minutes. Great care must be taken to have no powder on board when the ship is fired.]

The sheer-hooks (represented by *A*) are fitted so as to fasten on the yard-arms of the fire-ship, where they hook the enemy's rigging. The fire-grapplings, (*B*.) are either fixed on the yard-arms, or thrown by hand, having a chain to confine the ships together, or fasten those instruments wherever necessary.

When the commanding officer of a fleet displays the signal to prepare for action, the fire-ships fix their sheer-hooks, and dispose their grapplings in readiness. The battle being begun, they proceed immediately to prime, and prepare their fire-works. When they are ready for grappling, they inform the admiral thereof by a particular signal.

To avoid being disabled by the enemy's cannon during a general engagement, the fire-ships continue sufficiently distant from their line of battle, either to windward or to leeward.

They cautiously shun the openings or intervals of the line, where they would be directly exposed to the enemy's fire, from which they are covered by lying on the opposite side of their own ships. They are attentively to observe the signals of the admiral or his seconds, in order to put their designs immediately in execution.

Although no ship of the line should be previously appointed to protect any fire-ship, except a few of the smallest particularly destined to this service, yet the ship before whom she passes in order to approach the enemy, should escort her thither, and assist her with an armed boat, or whatever succour may be necessary in her situation.

The captain of the fire-ship should himself be particularly attentive that the above instructions are punctually executed, and that the yards may be so braced when he falls along-side of the ship intended to be destroyed, that the sheer-hooks and grapplings fastened to the yard-arms, &c. may effectually hook the enemy. He is expected to be the last person who quits the vessel; and being furnished with every necessary assistance and support, his reputation will greatly depend on the success of his enterprise.

Lambent FIRES, as the shining of meat at certain seasons, the luminousness of the sea, of insects, vapours, &c. See the articles *LIGHT*, *PHOSPHORUS*, *NEREIS*, *FIRE-Flies*, *GLOW-Worm*, &c.

Port-FIRE. See *PORT-FIRE*.

Spur-FIRE. See *SPUR-FIRE*.

FIRE-Works, are preparations made of gunpowder, sulphur, and other inflammable and combustible ingredients, used on occasion of public rejoicings and other solemnities.

The invention of fire-works is by M. Mahudel attributed to the Florentines and people of Sienna; who

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found out likewise the method of adding decorations to them of statues, with fire issuing from their eyes and mouths.

The art of preparing and managing these is called *pyrotechny*. See *PYROTECHNY*.

FIRING, in the military art, denotes the discharge of the fire-arms; and its object is to do the utmost execution to the enemy.

The present method of firing by platoons is said to have been invented by Gustavus Adolphus, and first used about the year 1618: the reason commonly given for this method is, that a constant fire may be always kept up. There are three different ways of platoon firing; viz. standing, advancing, and retreating. But previous to every kind of firing, each regiment or battalion must be told off in grand divisions, subdivisions, and platoons, exclusively of the grenadiers, which form two subdivisions or four platoons of themselves. In firing standing, either by divisions or platoons, the first fire is from the division or platoon on the right; the second fire from the left; the third from the right again; and so on alternately, till the firing comes to the centre platoon, which is generally called the *colour platoon*, and does not fire, remaining as a reserve for the colours. Firing advancing is performed in the same manner, with this addition, that before either division or platoon fires, it advances three paces forward. Firing retreating varies from either of the former methods; for before either division or platoon fires, if they are marching from the enemy, it must go to the right about, and after firing, to the left about again, and continue the retreat as slow and orderly as possible.

In hedge-firing the men are drawn up two deep, and in that order both ranks are to fire standing. Oblique firing is either to the right and left, or from the right and left to the centre, according to the situation of the object. The Prussians have a particular contrivance for this purpose; if they are to level to the right, the rear ranks of every platoon make two quick but small paces to the left, and the body of each soldier turns one-eighth of a circle, and *vice versa*. Parapet firing depends on the nature of the parapet over which the men are to fire, and also upon that of the attack made to possess it. This method of firing is sometimes performed by single ranks stepping on the banquette and firing; each man instantly handing his arms to the centre rank of the same file, and taking his back in the room of it; and the centre rank giving it to the rear to load, and forwarding the arms of the rear to the front rank; by which means the front rank men can fire six or seven rounds in a minute with exactness. Parapet firing may also be executed two deep, when the banquette is three feet broad, or in field works, where no banquettes are made. Square firing is performed by a regiment or body of men drawn up in a hollow square, in which case each front is generally divided into four divisions or firings, and the flanks of the square, being the weakest part, are covered by four platoons of grenadiers. The first fire is from the right division of each face; the second from the left division of each face, &c. and the grenadiers make the last fire. Street-firing is practised in two ways; either by making the division or platoon that has fired to wheel by half-rank to the right and left

Firing.

Firkin
||
first-born.

left outwards from the centre, and to march in that order by half divisions down the flanks on each side of the column, and to draw up in the rear, and go on with their priming and loading; or, to make the division or platoon, after firing, to face to the right and left outwards from the centre, and one half rank to follow the other; and in that order to march in one centre file down on each side of the column into the rear, and there draw up as before.

FIRING-IRON, in farriery, an instrument not unlike the blade of a knife; which being made red hot, is applied to a horse's hams, or other places standing in need of it, as in preternatural swellings, farcy, knots, &c. in order to discuss them.

FIRKIN, an English measure of capacity for things liquid, being the fourth part of the barrel: it contains eight gallons of ale, soap, or herrings; and nine gallons of beer.

FIRLOT, a dry measure used in Scotland. The oat-firlet contains $21\frac{1}{4}$ pints of that country; the wheat-firlet contains about 2211 cubical inches; and the barley-firlet, 31 standard-pints. Hence it appears that the Scotch wheat-firlet exceeds the English bushel by 33 cubical inches.

FIRMAMENT, in the ancient astronomy, the eighth heaven or sphere; being that wherein the fixed stars were supposed to be placed. It is called the *eighth*, with respect to the seven heavens or spheres of the planets which it surrounds.

It is supposed to have two motions; a diurnal motion, given it by the *primum mobile*, from east to west, about the poles of the ecliptic; and another opposite motion from west to east; which last it finishes, according to Tycho, in 25,412 years; according to Ptolemy, in 36,000; and according to Copernicus, in 258,000; in which time the fixed stars return to the same precise points wherein they were at the beginning. This period is commonly called Plato's year, or the great year.

In various places of Scripture the word *firmament* is used for the middle region of the air. Many of the ancients allowed, with the moderns, that the firmament is a fluid matter; though they, who gave it the denomination of *firmament*, must have taken it for a solid one.

FIRMAN, is a passport or permit granted by the Great Mogul to foreign vessels, to trade within the territories of his jurisdiction.

FIRMICUS MATERNUS (Julius), a famous writer, who composed in Latin, about the year 345, an excellent book in defence of Christianity, intitled, *De errore profanarum religionum*, which is printed with the notes of John Wouwer. There are also attributed to him eight books of astronomy, printed by Aldus Manutius in 1501; but this last work appears to have been written by another Julius Firmicus, who lived at the same time.

FIRMNESS, denotes the consistence of a body, or that state wherein its sensible parts cohere in such a manner, that the motion of one part induces a motion in the rest.

FIRST-BORN. See **PRIMOGENITURE**, for the literal meaning of the term.

In Scripture it is also used often in a figurative sense for that which is first, most excellent, most distinguish-

ed in any thing. Thus it is said of Christ (Col. i. 5.), *First-Fruits* that he is "the first-born of every creature;" and in Revelations (i. 5.) he is called "the first-begotten of the dead;" that is, according to the commentators, Begotten of the Father before any creature was produced; and the first who rose from the dead by his own power. "The first-born of the poor," (Isa. xiv. 30.) signifies, The most miserable of all the poor; and in Job (xviii. 13.) "The first-born of death;" that is, The most terrible of all deaths.

FIRST-FRUITS (*primitia*), among the Hebrews, were oblations of part of the fruits of the harvest, offered to God as an acknowledgment of his sovereign dominion. The first of these fruits was offered in the name of the whole nation, being either two loaves of bread, or a sheaf of barley which was threshed in the court of the temple. Every private person was obliged to bring his first-fruits to the temple; and these consisted of wheat, barley, grapes, figs, apricots, olives, and dates.

There was another sort of first-fruits which were paid to God. When bread was kneaded in a family, a portion of it was set apart, and given to the priest or Levite who dwelt in the place: if there was no priest or Levite there, it was cast into the oven, and consumed by the fire. These offerings made a considerable part of the revenues of the Hebrew priesthood.

First-fruits are frequently mentioned in ancient Christian writers as one part of the church revenue. One of the councils of Carthage enjoins, that they should consist only of grapes and corn; which shows, that this was the practice of the African church.

FIRST-FRUITS, in the church of England, are the profits of every spiritual benefice for the first year, according to the valuation thereof in the king's books.

FISC, **FISCUS**, in the civil law, the treasury of a prince or state; or that to which all things due to the public do fall. The word is derived from the Greek *φισκος* "a great basket," used when they went to market.—By the civil law, none but a sovereign prince has a right to have a fisc or public treasury.

At Rome, under the emperors, the term *ararium* was used for the revenues destined for support of the charges of the empire; and *fiscus* for those of the emperor's own family. The treasury, in effect, belonged to the people, and the fiscus to the prince. Hence the goods of condemned persons, if appropriated to the use of the public, were said *publicari*; if to the support of the emperor or prince, *confiscari*.

FISCAL, in the civil law, something relating to the pecuniary interest of the prince or people. The officers appointed for the management of the fisc, were called *procuratores fisci*; and *advocati fisci*; and among the cases enumerated in the constitutions of the empire, where it was their business to plead, one is against those who have been condemned to pay a fine to the fisc on account of their litigiousness or frivolous appeals.

FISCUS. See **Fisc**.

FISH, in natural history, an animal that lives in the waters as the natural place of its abode.

Fishes form the fourth class of animals in the Linnean system. Their most general or popular division is into *fresh* and *salt* water ones. Some, however, are of opinion, that all fishes naturally inhabit the salt-waters, and that they have mounted up into rivers


First-Fruits
||
Fifth.

Fish. only by accident. A few species only swim up into the rivers to deposit their spawn; but by far the greatest number keep in the sea, and would soon expire in fresh water. There are about 400 species of fishes (according to Linnæus) of which we know something; but the unknown ones are supposed to be many more; and as they are thought to lie in great depths of the sea remote from land, it is probable that many species will remain for ever unknown.

For the subdivisions, characters, and natural history of this class of animals, see the articles *ICHTHYOLOGY* and *ZOOLOGY*.

Blowing of Fish, is a practice similar to that of blowing flesh, poultry, and pigs, and adopted for the same deceitful purposes. The method of blowing fish, especially cod and whittings, is by placing the end of a quill or tobacco-pipe at the vent, and pricking a hole with a pin under the fin which is next the gill; thereby making the fish appear to the eye large and full, which when dressed will be flabby, and little else than skin and bones. But this imposition may be discovered by placing the finger and thumb on each side of the vent, and squeezing it hard; the wind may be perceived to go out, the skin will fall in, and the fish appear lank, and of little value.

Breeding of Fishes may be turned to great advantage; for, besides furnishing the table, obliging one's friends, and raising money, the land will be thereby greatly improved, so as to yield more this way than by any other employment whatever. See *FISH-POND*, *infra*; and *BREEDING of Fish*.

Castration of Fish, is a method first practised by Mr Tull, in order to prevent the excessive increase of fish in some of his ponds, where the numbers did not permit any of them to grow to an advantageous size. But he afterwards found, that the castrated fish grew much larger than their usual size, were more fat, and always in season. This operation may be performed both on male and female fish; and the most eligible time for it is when the ovaries of the female have their ova in them, and when the vessels of the male, analogous to these, have their seminal matter in them; because, at this time, these vessels are more easily distinguished from the ureters, which convey the urine from the kidneys into the bladder, and are situated near the seminal vessels on each side of the spine; which, without sufficient attention, may be mistaken for the ovaries, especially when these last are empty. The time least proper for this operation, is just after they have spawned, because the fish are then too weak and languid to bear, with success, so severe an operation; however, with skill and care, it may be performed almost at any time. When a fish is to be castrated, it must be held in a wet cloth, with its belly upwards; then with a sharp pen-knife, having its point bent backwards, the operator cuts through the integuments of the rim of the belly, taking care not to wound any of the intestines. As soon as a small aperture is made, he carefully inserts a hooked pen-knife, and with this dilates the aperture from between the two fore-fins almost to the anus. He then, with two small blunt silver-hooks, five or six inches long, and of this form , by the help of an assistant, holds open the belly of the fish; and, with a spoon or spatula, removes carefully the intestines from

one side. When these are removed, you see the ureter, a small vessel, nearly in the direction of the spine, and also the ovary, a larger vessel, lying before it, nearer the integuments of the belly. This last vessel is taken up with a hook of the same kind with those before mentioned, and, after detaching it from the side far enough for the purpose, divided transversely with a pair of sharp scissors, care being taken that the intestines are not wounded or injured. After one of the ovaries has been divided, the operator proceeds to divide the other in the same manner; and then the divided integuments of the belly are sewed with silk, the stitches being inserted at a small distance from one another. Mr Tull observes farther, that the spawning time is very various; that trouts are full about Christmas; perch in February; pikes in March, and carp and tench in May; and that allowance must be made for climate and situation, with regard to the spawning of fish. When the fish are castrated, they are put into the water where they are intended to continue; and they take their chance in common with other fish, as though they were not castrated. With tolerable care, few die of the operation. *Phil Trans.* vol. xlviii. Part 2. art. 106.

Although we could not properly avoid inserting the above detail, it is presumed that few will be pleased with the invention. The operation is peculiarly cruel, and the purpose of it only a detestable piece of Apician refinement.

Feeding of Fishes. When they are fed in large pools or ponds, either malt boiled, or fesh grains, is the best food; thus carps may be raised and fed like capons, and tenches will feed as well. The care of feeding them is best committed to a gardener or the butler, who should be always at hand. When fed in a stew, any sort of grain boiled, especially peas, and malt coarsely ground, are proper food; also the grains after brewing, while fresh and sweet; but one bushel of malt not brewed, will go as far as two of grains.

Stealing of Fish, by persons armed and disguised, is felony without benefit of clergy by 9 Geo. I. cap. 22. See *BLACK ACT*. And by 5 Geo. III. cap. 14. the penalty of transportation for seven years is inflicted on persons stealing or taking fish in any water, within a park, paddock, orchard, or yard; and on the receivers, aiders, and abettors; and a forfeiture of five pounds to the owner of the fishery is made payable by persons taking or destroying (or attempting so to do) any fish in any river or other water within any inclosed ground, being private property.

Preserving of Fish for Cabinets. Linnæus's method is, to expose them to the air; and when they acquire such a degree of putrefaction that the skin loses its cohesion to the body of the fish, it may be slid off almost like a glove: the two sides of this skin may then be dried upon paper like a plant, or one of the sides may be filled with plaster of Paris to give the subject a due plumpness.

A fish may be prepared, after it has acquired this degree of putrefaction, by making a longitudinal incision on the belly, and carefully dissecting the fleshy part from the skin, which are but slightly attached to it in consequence of the putrescency. The skin is then to be filled with cotton and the antiseptic powder

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as directed for birds; and, lastly, to be sewed up where the incision was made. See *Methods of Preserving Birds*.

Gold-Fish. See *CYPRINUS*.

Gilding on Fish. In the posthumous papers of Mr Hooke, a method is described of gilding live craw-fish, carps, &c. without injuring the fish. The cement for this purpose is prepared, by putting some burgundy-pitch into a new earthen pot, and warming the vessel till it receives so much of the pitch as will stick round it; then strewing some finely-powdered amber over the pitch when growing cold, adding a mixture of three pounds of linseed oil and one of oil of turpentine, covering the vessel, and boiling them for an hour over a gentle fire, and grinding the mixture, as it is wanted, with so much pumice-stone in fine powder as will reduce it to the consistence of paint. The fish being wiped dry, the mixture is spread upon it; and the gold-leaf being then laid on, and gently pressed down, the fish may be immediately put into water again, without any danger of the gold coming off, for the matter quickly grows firm in water.

FISH, in a ship, a plank or piece of timber, fastened to a ship's mast or yard, to strengthen it; which is done by nailing it on with iron spikes, and winding ropes hard about them.

FISHES, in heraldry, are the emblems of silence and watchfulness; and are borne either upright, imbowed, extended, endorsed respecting each other, surmounting one another, fretted, &c.

In blazoning fishes, those borne feeding, should be termed *devouring*; all fishes borne upright and having fins, should be blazoned *hauriant*; and those borne transverse the escutcheon, must be termed *naiant*.

FISH-PONDS, those made for the breeding or feeding of fish.

Fish ponds are no small improvement of watery and boggy lands, many of which are fit for no other use. In making of a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate or sluice, having a good fall, may not be too long in emptying. The best way of making the head secure, is to drive in two or three rows of stakes above six feet long, at about four feet distance from each other, the whole length of the pond-head, whereof the first row should be rammed at least about four feet deep. If the bottom is false, the foundation may be laid with quicklime; which slaking, will make it as hard as a stone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and when these are well covered, drive in others as they see occasion, ramming in the earth as before, till the pond-head be of the height designed.

The dam should be made sloping on each side, leaving a waste to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepest part need not exceed six feet, rising gradually in shoals towards the sides, for the fish to sun themselves, and lay their spawn. Gravelly and sandy bottoms, especially the latter, are best for breeding; and a fat soil with a white fat water, as the washings of hills, commons, streets, sinks, &c. is best for fattening all sorts of fish. For storing a pond, carp is to be preferred for its goodness, quick growth, and great increase, as breeding five or six times a year. A pond

of an acre, if it be a feeding and not breeding one, will every year feed 200 carps of three years old, 300 of two years old, and 400 of a year old. Carps delight in ponds that have marle or clay bottoms, with plenty of weeds and grafs, whereon they feed in the hot months.

Ponds should be drained every three or four years, and the fish sorted. In breeding ones, the smaller ones are to be taken out, to store other ponds with; leaving a good stock of females, at least eight or nine years old, as they never breed before that age. In feeding ponds, it is best to keep them pretty near of a size. See *BREEDING of Fish*.

FISHER (John), bishop of Rochester, was born at Beverly in Yorkshire, in the year 1459, and educated in the collegiate church of that place. In 1484, he removed to Michael-house in Cambridge, of which college he was elected master in the year 1495. Having applied himself to the study of divinity, he took orders; and, becoming eminent as a divine, attracted the notice of Margaret countess of Richmond, mother of Henry VII. who made him her chaplain and confessor. In 1501, he took the degree of doctor of divinity, and the same year was elected chancellor of the university. In the year following, he was appointed Lady Margaret's first divinity-professor; and, in 1504, consecrated bishop of Rochester; which small bishopric he would never resign, though he was offered both Ely and Lincoln. It is generally allowed, that the foundation of the two colleges of Christ-church and St John's, in Cambridge, was entirely owing to bishop Fisher's persuasion, and influence with the countess of Richmond: he not only formed the design, but superintended the execution. On the promulgation of Martin Luther's doctrine, our bishop was the first to enter the lists against him. On this occasion he exerted all his influence, and is generally supposed to have written the famous book by which Henry VIII. obtained the title of *Defender of the Faith*. Hitherto he continued in favour with the king; but in 1527, opposing his divorce, and denying his supremacy, the implacable Harry determined, and finally effected, his destruction. In 1534, the parliament found him guilty of misprision of treason, for concealing certain prophetic speeches of a fanatical impostor, called the *Holy Maid of Kent*, relative to the king's death; and condemned him, with five others, in loss of goods, and imprisonment during his majesty's pleasure; but he was released on paying 300 l. for the king's use.

King Henry being now married to Anne Boleyn, his obsequious parliament took an oath of allegiance proper for the occasion. This oath the bishop of Rochester steadily refused; alleging, that his conscience could not be convinced that the king's first marriage was against the law of God. For refusing this oath of succession, he was attainted by the parliament of 1534; and committed to the Tower, where he was cruelly treated, and where he would probably have died a natural death, had not the pope created him a cardinal. The king, now positively determined on his destruction, sent Rich, the solicitor-general, under a pretence of consulting the bishop on a case of conscience, but really with a design to draw him into a conversation concerning the supremacy. The honest old bishop spoke his mind without suspicion or reserve, and

Fisher.

Fishery. an indictment and conviction of high-treason was the consequence. He was beheaded on Tower-hill, on the 22d of June 1535, in the 77th year of his age. Thus died this good old prelate; who, notwithstanding his inflexible enmity to the reformation, was undoubtedly a learned, pious, and honest man. He wrote several treatises against Luther, and other works, which were printed at Wurtzburgh, in 1597, in one volume folio.

FISHERY, a place where great numbers of fish are caught.

The principal fisheries for salmon, herring, mackrel, pilchards, &c. are along the coasts of Scotland, England, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; and for pearls, in the East and West Indies.

Blackst. Comment.

Free FISHERY, in law, or an exclusive right of fishing in a public river, is a royal franchise; and is considered as such in all countries where the feudal polity has prevailed: though the making such grants, and by that means appropriating, what it seems unnatural to restrain, the use of running water, was prohibited for the future by king John's Great Charter; and the rivers that were fenced in his time were directed to be laid open, as well as the forests to be disforested. This opening was extended by the second and third charters of Henry III. to those also that were fenced under Richard I.; so that a franchise of free fishery ought now to be as old at least as the reign of Henry II. This differs from a *several of piscary*, because he that has a several fishery must also be the owner of the soil, which in a free-fishery is not requisite. It differs also from a *common fishery*, in that the free fishery is an exclusive right, the common fishery is not so: and therefore, in a free fishery, a man has a property in the fish before they are caught; in a common piscary, not till afterwards. Some indeed have considered a *free fishery* not as a royal franchise; but merely as a private grant of a liberty to fish in the *several fishery* of the granter. But the considering such right as originally a flower of the prerogative, till restrained by Magna Charta, and derived by royal grant (previous to the reign of Richard I.) to such as now claim it by prescription, may remove some difficulties in respect to this matter with which our law-books are embarrassed.

FISHERY, denotes also the commerce of fish, more particularly the catching them for sale.

Were we to enter into a very minute and particular consideration of fisheries, as at present established in this kingdom, this article would swell beyond its proper bounds; because, to do justice to a subject of such concernment to the British nation, requires a very ample and distinct discussion. We shall, however, observe, that since the Divine Providence hath so eminently stored the coasts of Great Britain and Ireland with the most valuable fish; and since fisheries, if successful, become permanent nurseries for breeding expert seamen; it is not only a duty we owe to the Supreme Being, not to despise the wonderful plenty he hath afforded us, by neglecting to extend this branch of commerce to the utmost; but it is a duty we owe to our country, for its natural security, which depends upon the strength of our royal navy. No nation can have a navy where there is not a fund of business to breed and employ seamen without any expence to the public; and no trade is so well calculated for

training up these useful members of society as fisheries.

The situation of the British coasts is the most advantageous in the world for catching fish: the Scottish islands, particularly those to the north and west, lie most commodious for carrying on the fishing trade to perfection; for no country in Europe can pretend to come up to Scotland in the abundance of the finest fish, with which its various creeks, bays, rivers, lakes, and coasts are replenished. Of these advantages, the Scots seem indeed to have been abundantly sensible; and their traffic in herrings, the most valuable of all the fisheries, is noticed in history so early as the ninth century*. The frequent laws which were enacted in the reigns of James III. IV. and V. discover a steady determined zeal for the benefit of the native subjects, and the full restoration of the fisheries, which the Dutch had latterly found means to engross, and do honour to the memory of those patriots whom modern times affect to call barbarians.

The expedition of James V. to the Hebrides and western parts of the Highlands, and his assiduity in exploring and founding the harbours, discovered a fixed resolution in that active prince; to civilize the inhabitants, to promote the valuable fisheries at their doors, and to introduce general industry. His death, at an early period, and the subsequent religious and civil commotions in the kingdom, frustrated those wise designs, and the western fisheries remained in their original state of neglect. At length, 1602, James VI. resumed the national purposes which had been thus chalked out by his grandfather. "Three towns, (says Dr Robertson) which might serve as a retreat for the industrious, and a nursery for arts and commerce, were appointed to be built in different parts of the Highlands; one in Cantire, another in Lochaber, and a third in the isle of Lewis; and in order to draw the inhabitants thither, all the privileges of the royal boroughs were to be conferred upon them. Finding it, however, to be no easy matter to inspire the inhabitants of those countries with the love of industry, a resolution was taken to plant among them colonies of people from the more industrious countries. The first experiment was made in the isle of Lewis; and as it was advantageously situated for the fishing trade (a source from which Scotland ought naturally to derive great wealth), the colony transported thither was drawn out of Fife, the inhabitants of which were well skilled in that branch of commerce. But before they had remained there long enough to manifest the good effects of this institution, the islanders, enraged at seeing their country occupied by those intruders, took arms, and surprising them in the night-time, murdered some of them, and compelled the rest to abandon the settlement. The king's attention being soon turned to other objects, particularly to his succession to the English crown, we hear no more of this salutary project."

The Scottish fisheries were, however, resumed by Charles I. who "ordained an association of the three kingdoms, for a general fishing within the haill seas and coasts of his majesty's said kingdoms; and for the government of the said association, ordained, that there should be a standing committee chosen and nominated by his majesty, and his successors from time

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* See art. 4. *infra.*

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to time," &c. &c. Several persons of distinction embarked in the design, which the king honoured with his patronage, and encouraged by his bounty. He also ordered lent to be more strictly observed; prohibited the importation of fish taken by foreigners; and agreed to purchase from the company his naval stores and the fish for his fleets. Thus the scheme of establishing a fishery in the Hebrides began to assume a favourable aspect; but all the hopes of the adventurers were frustrated by the breaking out of the civil wars, and the very tragical death of their benefactor.

In 1661, Charles II. duke of York, lord Clarendon, and other persons of rank or fortune, resumed the business of the fisheries with greater vigour than any of their predecessors. For this purpose the most salutary laws were enacted by the parliaments of England and Scotland; in virtue of which, all materials used in, or depending upon, the fisheries, were exempted from all duties, excises, or imposts whatever. In England, the company were authorised to set up a lottery, and to have a voluntary collection in all parish churches; houses of entertainment, as taverns, inns, ale-houses, were to take one or more barrels of herrings, at the stated price of 30 s. per barrel; also 2 s. 6 d. per barrel was to be paid to the stock of this company on all imported fish taken by foreigners. Some Dutch families were also invited, or permitted, to settle at Stornaway: the herrings cured by the royal English company gave general satisfaction, and, as mentioned above, brought a high price for those days. Every circumstance attending this new establishment seemed to be the result of a judicious plan and thorough knowledge of the business, when the necessities of the king obliged him to withdraw his subscription or bounty; which gave such umbrage to the parties concerned, that they soon after dissolved.

In 1677, a new royal company was established in England, at the head of which was the duke of York, the earl of Derby, &c. Besides all the privileges which former companies had enjoyed, the king granted this new company a perpetuity, with power to purchase lands; and also L. 20 to be paid them annually, out of the customs of the port of London, for every dogger or buss they should build and send out for seven years to come. A stock of L. 10,980 was immediately advanced, and afterwards L. 1600 more. This small capital was soon exhausted in purchasing and fitting out busses, with other incidental expences. The company made, however, a successful beginning; and one of their busses or doggers actually took and brought home 32,000 cod-fish; other vessels had also a favourable fishery. Such favourable beginnings might have excited fresh subscriptions, when an unforeseen event ruined the whole design beyond the possibility of recovery. Most of the busses had been built in Holland, and manned with Dutchmen; on which pretence the French, who were then at war with Holland, seized six out of seven vessels, with their cargoes and fishing-tackle; and the company being now in debt, sold, in 1680, the remaining stores, &c. A number of gentlemen and merchants raised a new subscription of L. 60,000, under the privileges and immunities of the former charter. This attempt also came to nothing, owing to the death of the king, and the troubles of the subsequent reign.

Soon after the revolution this business was again re-

sumed, and upon a more extensive scale; the proposed capital being 300,000 l. of which 100,000 l. was to have been raised by the surviving patentees or their successors, and 200,000 l. by new subscribers. Copies of the letters patent, the constitution of the company, and terms of subscription, were lodged at sundry places in London and Westminster, for the perusal of the public, while the subscription was filling. It is probable, that king William's partiality to the Dutch fisheries, the succeeding war, or both of these circumstances, frustrated this new attempt; of which we have no further account in the annals of that reign or since.

The Scottish parliament had also, during the three last reigns, passed sundry acts for erecting companies and promoting the fisheries; but the intestine commotions of that country, and the great exertions which were made for the Darien establishment, enfeebled all other attempts, whether collectively or by individuals, within that kingdom.

In 1749, his late majesty having, at the opening of the parliament, warmly recommended the improvement of the fisheries, the house of commons appointed a committee to inquire into the state of the herring and white fisheries, and to consider of the most probable means of extending the same. All ranks of men were elevated with an idea of the boundless riches that would flow into the kingdom from this source. A subscription of 500,000 l. was immediately filled in the city, by a body of men who were incorporated for 21 years by the name of *The Society of the Free British Fishery*. Every encouragement was held out by government, both to the society and to individuals, who might embark in this national business. A bounty of 36 s. per ton was to be paid annually out of the customs, for 14 years, to the owners of all decked vessels or busses, from 20 to 80 tons burden, which should be built after the commencement of the act, for the use of, and fitted out and employed in, the said fisheries, whether by the society or any other persons. At the same time numerous pamphlets and newspaper-essays came forth; all pretending to elucidate the subject, and to convince the public with what facility the herring fisheries might be transferred from Dutch to British hands. This proved, however, a more arduous task than had been foreseen by superficial speculators. The Dutch were frugal in their expenditures and living; perfect masters of the arts of fishing and curing, which they had carried to the greatest height and perfection. They were in full possession of the European markets; and their fish, whether deserving or otherwise, had the reputation of superior qualities to all others taken in our seas. With such advantages, the Dutch not only maintained their ground against this formidable company, but had also the pleasure of seeing the capital gradually sinking, without having procured an adequate return to the adventurers; notwithstanding various aids and efforts of government from time to time in their favour, particularly in 1757, when an advance of 20 s. per ton was added to the bounty.

In 1786 the public attention was again called to the state of the British fisheries, by the suggestions of Mr Dempster in the house of commons, and by different publications that appeared upon the subject: in consequence of which, the minister suffered a committee to be named, to inquire into this great source of national wealth. To that

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Fishery.

that committee it appeared, that the best way of improving the fisheries was to encourage the inhabitants living nearest to the seat of them to become fishers: And it being found that the north-western coast of the kingdom, though abounding with fish and with fine harbours, was utterly destitute of towns, an act was passed for incorporating certain persons therein named, by the style of "*The British Society for extending of the fisheries and improving the sea-coasts of this kingdom*;" and to enable them to subscribe a joint stock, and therewith to purchase lands, and build thereon free towns, villages, and fishing stations in the Highlands and islands in that part of Great Britain called Scotland, and for other purposes. The Isle of Mull, Loch-Broom, the Isle of Sky and of Cannay, have already been pitched upon as proper situations for some of these towns. The progress of such an undertaking from its nature must be slow, but still slower when carried on with a limited capital arising from the subscriptions of a few public-spirited individuals. But it is not to be doubted but that it will ultimately tend to the increase of our fisheries, and to the improvement of the Highland part of this kingdom. Its tendency is also to lessen the emigration of a brave and industrious race of inhabitants, too many of whom have already removed with their families to America.

1. *Anchovy-FISHERY.* The anchovy is caught in the months of May, June, and July, on the coasts of Catalonia, Provence, &c: at which season it constantly repairs up the straits of Gibraltar, into the Mediterranean. Collins says they are also found in plenty on the western coasts of England and Wales.

The fishing for them is chiefly in the night-time; when a light being put on the stern of their little fishing-vessels, the anchovies flock round, and are caught in the nets. But then it is asserted to have been found by experience, that anchovies taken thus by fire, are neither so good, so firm, nor so proper for keeping, as those which are taken without fire.

When the fishery is over, they cut off the heads, take out their gall and guts, and then lay them in barrels, and salt them. The common way of eating anchovies is with oil, vinegar, &c. in order to which they are first boned, and the tails, fins, &c. slipped off.—Being put on the fire, they dissolve almost in any liquor. Or they are made into sauce by mincing them with pepper, &c. Some also pickle anchovies in small delft or earthen pots, made on purpose, of two or three pound weight, more or less, which they cover with plaster to keep them the better. Anchovies should be chosen small, fresh pickled, white on the outside and red within. They must have a round back; for those which are flat or large are often nothing but sardines. Beside these qualities, the pickle, on opening the pots or barrels, must be of a good taste, and not have lost its flavour.

2. *Cod FISHERY.* There are two kinds of cod-fish; the one green or white cod, and the other dried or cured cod; though it is all the same fish *, differently prepared; the former being sometimes salted and barrelled, then taken out for use; and the latter, having lain some competent time in salt, dried in the sun or smoke. We shall therefore speak of each of these apart; and first of the

Green. The chief fisheries for green cod are in

the bay of Canada, on the great bank of Newfoundland, and on the isle of St-Peter, and the isle of Sable; to which places vessels resort from divers parts both of Europe and America. They are from 100 to 150 tons burden, and will catch between 30,000 and 40,000 cod each. The most essential part of the fishery is, to have a master who knows how to cut up the cod, one who is skilled to take off the head properly, and above all a good salter, on which the preserving of them, and consequently the success of the voyage, depends. The best season is from the beginning of February to the end of April; the fish, which in the winter retire to the deepest water, coming then on the banks, and fattening extremely. What is caught from March to June keeps well; but those taken in July, August, and September, when it is warm on the banks, are apt to spoil soon. Every fisher takes but one at a time: the most expert will take from 350 to 400 in a day; but that is the most, the weight of the fish and the great coldness on the bank fatiguing very much. As soon as the cod are caught, the head is taken off; they are opened, gutted, and salted; and the salter stows them in the bottom of the hold, head to tail, in beds a fathom or two square; laying layers of salt and fish alternately, but never mixing fish caught on different days. When they have lain thus three or four days to drain off the water, they are replaced in another part of the ship, and salted again; where they remain till the vessel is loaded. Sometimes they are cut in thick pieces, and put in barrels for the convenience of carriage.

Dry. The principal fishery for this article is, from Cape Rose to the Bay des Exports, along the coast of Placentia, in which compass there are divers commodious ports for the fish to be dried in. These, though of the same kind with the fresh cod, are much smaller, and therefore fitter to keep, as the salt penetrates more easily into them. The fishery of both is much alike; only this latter is most expensive, as it takes up more time, and employs more hands, and yet scarce half so much salt is spent in this as in the other. The bait is herrings, of which great quantities are taken on the coast of Placentia. When several vessels meet and intend to fish in the same port, he whose shallop first touches ground, becomes intitled to the quality and privileges of admiral: he has the choice of his station, and the refusal of all the wood on the coast at his arrival. As fast as the masters arrive, they unrig all their vessels, leaving nothing but the shrouds to sustain the masts; and in the mean time the mates provide a tent on shore, covered with branches of trees, and sails over them, with a scaffold of great trunks of pines, 12, 15, 16, and often 20 feet high, commonly from 40 to 60 feet long, and about one-third as much in breadth. While the scaffold is preparing, the crew are a-fishing; and as fast as they catch, they bring their fish ashore, and open and salt them upon moveable benches; but the main salting is performed on the scaffold. When the fish have taken salt, they wash and hang them to drain on rails; when drained, they are laid on kinds of stages, which are small pieces of wood laid across, and covered with branches of trees, having the leaves stripped off for the passage of the air. On these stages, they are disposed, a fish thick, head against tail, with the back uppermost, and are turned carefully four

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four times every 24 hours. When they begin to dry, they are laid in heaps 10 or 12 thick, in order to retain their warmth; and every day the heaps are enlarged, till they become double their first bulk; then two heaps are joined together, which they turn every day as before: lastly, they are salted again, beginning with those first salted; and being laid in huge piles, they remain in that situation till they are carried on board the ships, where they are laid on the branches of trees disposed for that purpose, upon the ballast, and round the ship, with mats to prevent their contracting any moisture.

There are four kinds of commodities drawn from cod, viz. the zounds, the tongues, the roes, and the oil extracted from the liver. The first is salted at the fishery, together with the fish, and put in barrels from 600 to 700 pound. The tongues are done in like manner, and brought in barrels from 400 to 500 pounds. The roes are also salted in barrels, and serve to cast into the sea to draw fish together, and particularly pilchards. The oil comes in barrels, from 400 to 520 pounds, and is used in dressing leather. In Scotland, they catch a small kind of cod on the coasts of Buchan, and all along the Murray frith on both sides; as also in the frith of Forth, Clyde, &c. which is much esteemed. They salt and dry them in the sun upon rocks, and sometimes in the chimney.

3. Coral-Fishery. See CORAL.

4. Herring-Fishery. Our great stations for this fishery are off the Shetland and Western Isles, and off the coast of Norfolk, in which the Dutch also share*. There are two seasons for fishing herring: the first from June to the end of August; and the second in Autumn, when the fogs become very favourable for this kind of fishing. The Dutch begin their herring-fishing on the 24th of June, and employ a vast number of vessels therein; called *buffes*, being between 45 and 60 tons burden each, and carrying three or four small cannon. They never stir out of port without a convoy, unless there be enough together to make about 18 or 20 cannon among them, in which case they are allowed to go in company. Before they go out, they make a verbal agreement, which has the same force as if it were in writing. The regulations of the admiralty of Holland are partly followed by the French and other nations, and partly improved and augmented with new ones; as, that no fisher shall cast his net within 100 fathoms of another boat: that while the nets are cast, a light shall be kept on the hind-part of the vessel: that when a boat is by any accident obliged to leave off fishing, the light shall be cast into the sea: that when the greater part of a fleet leaves off fishing, and casts anchor, the rest shall do the same, &c.

Hist. of commerce.

Mr Anderfon† gives to the Scots a knowledge of great antiquity in the herring-fishery. He says that the Netherlanders resorted to these coasts as early as A. D. 836, to purchase salted fish of the natives; but, imposing on the strangers, they learned the art, and took up the trade, in after-times of such immense emolument to the Dutch.

Sir Walter Raleigh's observations on that head, extracted from the same author, are extremely worthy the attention of the curious, and excite reflections on the vast strength resulting from the wisdom of well applied industry.

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In 1603, he remarks the Dutch sold to different nations, as many herrings as amounted to L. 1,759,000 Sterling. In the year 1615, they at once sent out 2000 buffes, and employed in them 37,000 fishermen. In the year 1618, they sent out 3000 ships, with 50,000 men to take the herrings, and 9000 more ships to transport and sell the fish; which by sea and land employed 150,000 men, besides those first mentioned. All this wealth was gotten on our coasts; while our attention was taken up in a distant whale-fishery.

The Scottish monarchs for a long time seemed to direct all their attention to the preservation of the salmon fishery; probably because their subjects were such novices in sea-affairs. At length James III. endeavoured to stimulate his great men to these patriotic undertakings; for by an act of his third parliament, he compelled "certain lords spiritual and temporal, and burrows, to make ships, buffes, and boats, with nets, and other pertinents, for fishing. That the same should be made in each burgh; in number according to the substance of each burgh, and the least of them to be of twenty tons: and that all idle men be compelled by the sheriffs in the country to go on board the same."

Numerous indeed have been the attempts made at different periods to secure this treasure to ourselves, but without success. In the late reign, a very strong effort was made, and bounties allowed for the encouragement of British adventurers: the first was of 30s. *per* ton to every buf of 70 tons and upwards. This bounty was afterwards raised to 50s. *per* ton, to be paid to such adventurers as were intitled to it by claiming it at the places of rendezvous. The buffes are from 20 to 90 tons burden, but the best size is 80. A vessel of 80 tons ought to take ten lasts, or 120 barrels of herrings, to clear expences, the price of the fish to be admitted to be a guinea a barrel. A ship of this size ought to have 18 men, and three boats: one of 20 tons should have six men; and every five tons above, require an additional hand. To every ton are 280 yards of nets; so a vessel of 80 tons carries 20,000 square yards: each net is 12 yards long, and 10 deep; and every boat takes out from 20 to 30 nets, and puts them together, so as to form a long train; they are sunk at each end of the train by a stone, which weighs it down to the full extent: the top is supported by buoys, made of sheepskin, with a hollow stick at the mouth, fastened tight; through this the skin is blown up, and then stopped with a peg, to prevent the escape of the air. Sometimes these buoys are placed at the top of the nets; at other times the nets are suffered to sink deeper, by the lengthening the cords fastened to them, every cord being for that purpose 10 or 12 fathoms long. But the best fisheries are generally in more shallow water.

Of the Scots fishery in the Western Isles, the following account is given by Mr Pennant*. "The fishing is always performed in the night, unless by accident. The buffes remain at anchor, and send out their boats a little before sun-set; which continue out, in winter and summer, till day-light; often taking up and emptying their nets, which they do 10 or 12 times in a night, in case of good success. During winter it is a most dangerous and fatiguing employ, by reason of the greatness and frequency of the gales in these seas, and in such gales are the most successful captures: but, by the Providence of heaven, the fishers are seldom lost; and, what is wonderful,

Voyage to the Hebrides.

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derful, few are visited with illness. They go out well prepared, with a warm great coat, boots, and skin aprons, and a good provision of beef and spirits. The same good fortune attends the buffes, which in the tempestuous season, and in the darkest nights, are continually shifting, in these narrow seas, from harbour to harbour. Sometimes 80 barrels of herrings are taken in a night by the boats of a single vessel. It once happened, in Loch-Slappan, in Skie, that a buff of 80 tons might have taken 200 barrels in one night, with 10,000 square yards of net; but the master was obliged to desist, for want of a sufficient number of hands to preserve the capture. The herrings are preserved by salting, after the entrails are taken out. This last is an operation performed by the country-people, who get three-halfpence per barrel for their trouble; and sometimes, even in the winter, can gain fifteen pence a-day. This employs both women and children; but the salting is only entrusted to the crew of the buffes. The fish are laid on their backs in the barrels, and layers of salt between them. The entrails are not lost, for they are boiled into an oil: 8000 fish will yield ten gallons, valued at one shilling the gallon. A vessel of 80 tons takes out 144 barrels of salt; a drawback of 2s. 8d. is allowed for each barrel used by the foreign or Irish exportation of the fish; but there is a duty of 1s. per barrel for the home-consumption, and the same for those sent to Ireland. The barrels are made of oak-staves, chiefly from Virginia; the hoops from several parts of our own island, and are either of oak, birch, hazel, or willow: the last from Holland, liable to a duty. The barrels cost about 3s. each, they hold from 500 to 800 fish, according to the size of the fish; and are made to contain 32 gallons. The barrels are inspected by proper officers: a cooper examines if they are statutable and good; if faulty, he destroys them, and obliges the maker to stand to the loss.

"Loch-Broom has been celebrated for three or four centuries as the resort of herrings. They generally appear here in July; those that turn into this bay are part of the brigade that detaches itself from the western column of that great army which annually deserts the vast depths of the arctic circle, and come, heaven-directed, to the seats of population, offered as a cheap food to millions, whom wasteful luxury or iron-hearted avarice hath deprived, by enhancing the price of the wonted supports of the poor. The migration of these fish from their northern retreat is regular; their visits to the Western isles and coasts, certain; but their attachment to one particular loch, extremely precarious. All have their turns: that which swarmed with fish one year, is totally deserted the following; yet the next loch to it may be crowded with the shoals. These changes of place give often full employ to the buffes, who are continually shifting their harbour in quest of news respecting these important wanderers. They commonly appear here in July; the latter end of August they go into deep water, and continue there for some time, without any apparent cause: in November, they return to the shallows, when a new fishery commences, which continues till January; at that time the herrings become full of roe, and are useless as articles of commerce. Some doubt, whether those herrings that appear in November are not part

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of a new migration; for they are as fat, and make the same appearance, as those that composed the first. The signs of the arrival of the herrings are flocks of gulls, who catch up the fish while they skim on the surface; and of gannets, who plunge and bring them up from considerable depths. Both these birds are closely attended to by the fishers. Cod-fish, haddocks, and dog-fish, follow the herrings in vast multitudes; these voracious fish keep on the outsidings of the columns, and may be a concurrent reason of driving the shoals into bays and creeks. In summer, they come into the bays generally with the warmest weather, and with easy gales. During winter, the hard gales from north-west are supposed to assist in forcing them into shelter. East winds are very unfavourable to the fishery."

Herrings are cured either white or pickled, or red.

Of the *first*, those done by the Dutch are the most esteemed, being distinguished into four sorts, according to their sizes; and the best are those that are fat, fleshy, firm, and white, salted the same day they are taken, with good salt, and well barrelled. The British cured herrings are little inferior, if not equal, to the Dutch; for in spite of all their endeavours to conceal the secret, their method of curing, lasting, or casking the herrings, has been discovered, and is as follows. After they have hauled in their nets, which they drag in the stern of their vessels backwards and forwards in traversing the coast, they throw them upon the ship's deck, which is cleared of every thing for that purpose: the crew is separated into sundry divisions, and each division has a peculiar task; one part opens and guts the herrings, leaving the melts and roes; another cures and salts them, by lining or rubbing their inside with salt; the next packs them, and between each row and division they sprinkle handfuls of salt; lastly, the cooper puts the finishing hand to all, by heading the casks very tight, and stowing them in the hold.

Red herrings must lie 24 hours in the brine, in as much as they are to take all their salt there; and when they are taken out, they are spitted, that is, strung by the head on little wooden spits, and then hung in a chimney made for that purpose. After which, a fire of brush-wood, which yields a deal of smoke but no flame, being made under them, they remain there till sufficiently smoked and dried, and are afterwards barrelled up for keeping.

5. *Lobster*-FISHERY*. Lobsters are taken along the British channel, and on the coast of Norway, whence they are brought to London for sale; and also in the frith of Edinburgh, and on the coast of Northumberland. By 10 and 11 W. III. cap. 24. no lobster is to be taken under eight inches in length, from the peak of the nose to the end of the middle fin of the tail; and by 9 G. II. cap. 33. no lobsters are to be taken on the coast of Scotland from the first of June to the first of September.

6. *Mackrel†-FISHERY*. The mackrel is a summer fish of passage, found in large shoals, in divers parts of the ocean, not far north; but especially on the French and English coasts. The fishing is usually in the months of April, May, and June, and even July, according to the place. They enter the English chan-

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nel in April, and proceed up to the straits of Dover as the summer advances; so that by June they are on the coasts of Cornwall, Suffex, Normandy, Picardy, &c. where the fishery is most considerable. They are an excellent food fresh; and not to be despised, when well prepared, pickled, and put up in barrels; a method of preserving them chiefly used in Cornwall.

The fish is taken two ways; either with a line or nets: the latter is the more considerable, and is usually performed in the night-time. The rules observed in the fishing for mackrel are much the same as those already mentioned in the fishery of herrings.

There are two ways of pickling them: the first is, by opening and gutting them, and filling the belly with salt, crammed in as hard as possible with a stick; which done, they range them in strata or rows, at the bottom of the vessel, strewing salt between the layers. In the second way, they put them immediately into tubs full of brine, made of fresh water and salt; and leave them to steep, till they have imbibed salt enough to make them keep; after which, they are taken out, and barrellled up, taking care to press them close down.

Mackrel are not cured or exported as merchandize except a few by the Yarmouth and Leostoff merchants, but are generally consumed at home; especially in the city of London, and the sea-ports between the Thames and Yarmouth, east, and the Land's end of Cornwall west.

See O-
frea.

7. *Oyster-Fishery*. This fishery is principally carried on at Colchester in Essex; Feverham and Milton in Kent; the Isle of Wight; the Swales of the Medway; and Tenby on the coast of Wales. From Feverham, and adjacent parts, the Dutch have sometimes loaded a hundred large hoys with oysters in a year. They are also taken in great quantities near Portsmouth, and in all the creeks and rivers between Southampton and Chichester: many of which are carried about by sea to London and to Colchester, to be fed in the pits about Wavenhoe and other places.

8. *Pearl-Fishery*. See PEARL.

9. *Pilchard-Fishery*. The chief pilchard fisheries are along the coasts of Dalmatia, on the coast of Bretagne, and along the coasts of Cornwall and Devonshire. That of Dalmatia is very plentiful: that on the coasts of Bretagne employs annually about 300 ships. Of the pilchard fishery on the coast of Cornwall the following account is given by Dr Borlase: "It employs a great number of men on the sea, training them thereby to naval affairs; employs men, women, and children, at land, in salting, pressing, washing, and cleaning; in making boats, nets, ropes, calks, and all the trades depending on their construction and sale. The poor are fed with the offals of the captures, the land with the refuse of the fish and salt; the merchant finds the gains of commission and honest commerce, the fisherman the gains of the fish. Ships are often freighted hither with salt, and into foreign countries with the fish, carrying off at the same time part of our tin. The usual produce of the great number of hogsheds exported each year for ten years from 1747 to 1756 inclusive, from the four ports of Fowy, Falmouth, Penzance, and St Ives, it appears that Fowy has exported yearly 1732 hogsheds; Falmouth, 14,631 hogsheds and two thirds: Penzance and Mounts-Bay 12,149

hogsheds and one third; St Ives, 1282 hogsheds: in all amounting to 29,795 hogsheds. Every hogshedd for ten years last past, together with the bounty allowed for each hogshedd exported, and the oil made out of each hogshedd, has amounted, one year with another at an average, to the price of 1*l.* 13*s.* 3*d.*; so that the cash paid for pilchards exported has, at a medium, annually amounted to the sum of 49,532 *l.* 10*s.*"—The numbers that are taken at one shooting out of the nets are amazingly great. Mr Pennant says, that Dr Borlase assured him, that on the 5th of October 1767, there were at one time inclosed in St Ives's Bay 7000 hogsheds, each hogshedd containing 35,000 fish, in all 245 millions.

The pilchards naturally follow the light, which contributes much to the facility of the fishery: the season is from June to September. On the coasts of France they make use of the roes of the cod-fish as a bait; which, thrown into the sea, makes them rise from the bottom, and run into the nets. On our coasts there are persons posted ashore, who, spying by the colour of the water where the shoals are, make signs to the boats to go among them to cast their nets. When taken, they are brought on shore to a warehouse, where they are laid up in broad piles, supported with backs and sides; and as they are piled, they salt them with bay-salt; in which lying to soak for 30 or 40 days, they run out a deal of blood, with dirty pickle and bittern: then they wash them clean in sea-water; and, when dry, barrel and press them hard down to squeeze out the oil, which issues out at a hole in the bottom of the cask.

10. *Salmon*-Fishery*. The chief salmon fisheries in Europe are in England, Scotland, and Ireland, in the rivers, and sea-coasts adjoining to the river-mouths. The most distinguished for salmon in Scotland are, the river Tweed, the Clyde, the Tay, the Dee, the Don, the Spey, the Ness, the Bewly, &c. in most of which it is very common, about the height of summer, especially if the weather happens to be very hot, to catch four or five score salmon at a draught. The chief rivers in England for salmon are, the Tyne, the Trent, the Severn, and the Thames. The fishing is performed with nets, and sometimes with a kind of locks or weirs made on purpose, which in certain places have iron or wooden grates so disposed, in an angle, that being impelled by any force in a contrary direction to the course of the river, they may give way and open a little at the point of contact, and immediately shut again, closing the angle. The salmon, therefore, coming up into the rivers, are admitted into these grates, which open, and suffer them to pass through, but shut again, and prevent their return. The salmon is also caught with a spear, which they dart into him when they see him swimming near the surface of the water. It is customary likewise to catch them with a candle and lantern, or wisp of straw set on fire; for the fish naturally following the light, are struck with the spear, or taken in a net spread for that purpose, and lifted with a sudden jerk from the bottom.

"The capture of salmon in the Tweed, about the month of July (says Mr Pennant†) is prodigious. In a good fishery, often a boat-load, and sometimes near two, are taken in a tide: some few years ago there were

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* See Sal.
mo.† Brit. Zool.
iii. 289.

Fishery. above 700 fish taken at one haul, but from 50 to 100 is very frequent. The coopers in Berwick then begin to salt both salmon and gillies in pipes and other large vessels, and afterwards barrel them to send abroad, having then far more than the London markets can take off their hands.

"Most of the salmon taken before April, or to the setting in of the warm weather, is sent fresh to London in baskets; unless now and then the vessel is disappointed by contrary winds of sailing immediately; in which case the fish is brought ashore again to the coopers' offices, and boiled, pickled, and kitted, and sent to the London markets by the same ship, and fresh salmon put in the baskets in lieu of the stale ones. At the beginning of the season, when a ship is on the point of sailing, a fresh clean salmon will sell from a shilling to eighteen pence a pound; and most of the time that this part of the trade is carried on, the prices are from five to nine shillings per stone; the value rising and falling according to the plenty of fish, or the prospect of a fair or foul wind. Some fish are sent in this manner to London the latter end of September, when the weather grows cool; but then the fish are full of large roes, grow very thin-bellied, and are not esteemed either palatable or wholesome.

"The season for fishing in the Tweed begins November 30th, but the fishermen work very little till after Christmas: it ends on Michaelmas-day; yet the corporation of Berwick (who are conservators of the river) indulge the fishermen with a fortnight past that time, on account of the change of the style.

"There are on the river 41 considerable fisheries, extending upwards, about 14 miles from the mouth, (the others above being of no great value), which are rented for near 5400 *l. per annum*: the expence attending the servants wages, nets, boats, &c. amount to 5000 *l.* more; which together makes up the sum 10,400 *l.* Now, in consequence, the produce must defray all, and no less than 20 times that sum of fish will effect it; so that 208,000 salmon must be caught there one year with another.

"Scotland possesses great numbers of fine fisheries on both sides of that kingdom. The Scotch in early times had most severe laws against the killing of this fish; for the third offence was made capital, by a law of James IV. Before that, the offender had power to redeem his life. They were thought in the time of Henry VI. a present worthy of a crowned head: for in that reign the queen of Scotland sent to the dukes of Clarence 10 casks of salted salmon; which Henry directed to pass duty-free. The salmon are cured in the same manner as at Berwick, and a great quantity is sent to London in the spring; but after that time, the adventurers began to barrel and export them to foreign countries: but we believe that commerce is far less lucrative than it was in former times, partly owing to the great increase of the Newfoundland fishery, and partly to the general relaxation of the discipline of abstinence in the Romish church.

"Ireland (particularly the north) abounds with this fish: the most considerable fishery is at Cranna, on the river Ban, about a mile and an half from Coleraine. When I made the tour of that hospitable kingdom in 1754, it was rented by a neighbouring gentleman for *£* 620 a-year; who assured me, that the tenant, his

predecessor, gave *£* 1600 *per annum*, and was a much greater gainer by the bargain, for the reasons before-mentioned, and on account of the number of poachers who destroy the fish in the fence-months.

"The mouth of this river faces the north; and is finely situated to receive the fish that roam along the coast in search of an inlet into some fresh water, as they do all along that end of the kingdom which opposes itself to the northern ocean. We have seen near Ballicastle, nets placed in the sea at the foot of the promontories that jut into it, which the salmon strike into as they are wandering close to shore; and numbers are taken by that method.

"In the Ban they fish with nets 18 score yards long, and are continually drawing night and day the whole season, which we think lasts about four months, two sets of 16 men each alternately relieving one another. The best drawing is when the tide is coming in: we were told, that at a single draught there were once 840 fish taken.

"A few miles higher up the river is a wear, where a considerable number of fish that escape the nets are taken. We were lately informed, that, in the year 1760, about 320 tons were taken in the Crana fishery."

Curing Salmon. When the salmon are taken, they open them along the back, take out the guts and gills, and cut out the greatest part of the bones, endeavouring to make the inside as smooth as possible: they then salt the fish in large tubs for the purpose, where they lie a considerable time soaking in brine; and about October, they are packed close up in barrels, and sent to London, or exported up the Mediterranean. They have also in Scotland a great deal of salmon salted in the common way, which after soaking in brine a competent time, is well pressed, and then dried in smoke: this is called *kipper*, and is chiefly made for home consumption; and if properly cured and prepared, is reckoned very delicious.

Sturgeon † **FISHERY.** The greatest sturgeon-fishery * See *Act* is in the mouth of the Volga, on the Caspian sea; *penfer*. where the Muscovites employ a great number of hands, and catch them in a kind of inclosure formed by huge stakes representing the letter Z repeated several times. These fisheries are open on the side next the sea, and close on the other; by which means the fish ascending in its season up the river, is embarrassed in these narrow angular retreats, and so is easily killed with a harping-iron. Sturgeons, when fresh, eat deliciously; and in order to make them keep, they are salted or pickled in large pieces, and put up in cags from 30 to 50 pounds. But the great object of this fishery is the roe, of which the Muscovites are extremely fond, and of which is made the caviar, or kavia, so much esteemed by the Italians. See **CAVEAR**.

Tunny-FISHERY. The tunny (a species of *SCOMBER*, which see), was a fish well-known to the ancients, and made a great article of commerce: And there are still very considerable tunny-fisheries on the coasts of Sicily, as well as several other parts of the Mediterranean.

The nets are spread over a large space of sea by means of cables fastened to anchors, and are divided into several compartments. The entrance is always directed, according to the season, towards that part of the sea from which the fish are known to come. A

Fishery. man placed upon the summit of a rock high above the water, gives the signal of the fish being arrived; for he can discern from that elevation what passes under the waters infinitely better than any person nearer the surface. As soon as notice is given that the shoal of fish has penetrated as far as the inner compartment, or the chamber of death, the passage is drawn close, and the slaughter begins.

The undertakers of these fisheries pay an acknowledgment to the king, or the lord upon whose land they fix the main stay or foot of the tonnara; they make the best bargain they can: and, till success has crowned their endeavours, obtain this leave for a small consideration; but the rent is afterwards raised in proportion to their capture.

The tunny enters the Mediterranean about the vernal equinox, travelling in a triangular phalanx, so as to cut the waters with its point, and to present an extensive base for the tides and currents to act against, and impel forwards. These fish repair to the warm seas of Greece to spawn, steering their course thither along the European shores, but as they return, approach the African coast; the young fry is placed in the van of the squadron as they travel. They come back from the east in May, and abound on the coast of Sicily and Calabria about that time. In autumn they steer northward, and frequent the neighbourhood of Amalfi and Naples; but during the whole season stragglers are occasionally caught.

When taken in May, the usual time of their appearance in the Calabrian bays, they are full of spawn, and their flesh is then esteemed unwholesome, apt to occasion headaches and vapours; the milts and roes are particularly so at that season. To prevent these bad effects, the natives fry them in oil, and afterwards salt them. The quantity of this fish consumed annually in the two Sicilies almost exceeds the bounds of calculation. From the beginning of May to the end of October it is eaten fresh, and all the rest of the year it is in use salted. The most delicate part is the muzzle. The belly salted was called *tarantallum*, and accounted a great delicacy by the Romans; its present name is *Surra*. The rest of the body is cut into slices, and put into tubs.

Turbot-Fishery. Turbots grow to a large size, some of them weighing from 23 to 30 pounds. They are taken chiefly off the north coast of England, and others off the Dutch coast. The large turbot (as well as several other kinds of flat fish) are taken by the hook and line, for they lie in deep water; the method of taking them in weirs or staked nets being very precarious. When the fishermen go out to fish, each person is provided with three lines, which are coiled on a flat oblong piece of wicker-work; the hooks being baited, and placed regularly in the centre of the coil. Each line is furnished with 14 score of hooks, at the distance of six feet two inches from each other. The hooks are fastened to the lines upon snoods of twisted horse-hair 27 inches in length. When fishing, there are always three men in each coble, and consequently nine of these lines are fastened together, and used as one line, extending in length near three miles, and furnished with 2520 hooks. An anchor and a buoy are fixed at the first end of the line, and one more of each at the end of each man's lines; in all four anchors, which

are common perforated stones, and four buoys made of leather or cork. The line is always laid across the current. The tides of flood and ebb continue an equal time upon our coast, and, when undisturbed by winds, run each way about six hours; they are so rapid that the fishermen can only shoot and haul their lines at the turn of tide, and therefore the lines always remain upon the ground about six hours; during which time the *myxine glutinosa* of Linnæus will frequently penetrate the fish that are on the hooks, and entirely devour them, leaving only the skin and bones. The same rapidity of tides prevents their using hand-lines; and therefore two of the people commonly wrap themselves in the sail, and sleep while the other keeps a strict look-out, for fear of being run down by ships, and to observe the weather. For storms often rise so suddenly, that it is with extreme difficulty they can sometimes escape to the shore, leaving their lines behind.

Besides the coble, the fishermen have also a five-men boat, which is 40 feet long and 15 broad, and 25 tons burden; it is so called, though navigated by six men and a boy, because one of the men is commonly hired to cook, &c. and does not share in the profits with the other five. This boat is decked at each end, but open in the middle, and has two large lug-sails. All our able fishermen go in these boats to the herring-fishery at Yarmouth in the latter end of September, and return about the middle of November. The boats are then laid up till the beginning of Lent, at which time they go off in them to the edge of the Dogger, and other places, to fish for turbot, cod, line, skates, &c. They always take two cobbles on board; and when they come upon their ground, anchor the boat, throw out the cobbles, and fish in the same manner as those do who go from the shore in a coble; with this difference only, that here each man is provided with double the quantity of lines, and instead of waiting the return of the tide in the coble, return to their boat and bait their other lines; thus hawling one set and shooting another every turn of tide. They commonly run into harbour twice a week to deliver their fish.

The best bait is fresh herring cut in pieces of a proper size; the five-men boats are always furnished with nets for taking them. Next to herrings are the lesser lampreys. The next baits in esteem are small haddocks cut in pieces, sand-worms, and limpets, here called *slidders*; and when none of these can be had, they use bullock's liver. The hooks are two inches and a half long in the shank, and near an inch wide between the shank and the point. The line is made of small cording, and is always tanned before it is used.

Turbots are extremely delicate in their choice of baits; for if a piece of herring or haddock has been 12 hours out of the sea, and then used as bait, they will not touch it.

Whale*-Fishery. Whales are chiefly caught in the north seas: the largest sort are found about Greenland or Spitzbergen. At the first discovery of this country, whales not being used to be disturbed, frequently came into the very bays, and were accordingly killed almost close to the shore; so that the blubber being cut off was immediately boiled into oil on the spot. The ships in those times took in nothing but the pure oil and the whalebone, and all the business was executed

Fishery. in the country; by which means a ship could bring home the product of many more whales than she can according to the present method of conducting this trade. The fishery also was then so plentiful, that they were obliged sometimes to send other ships to fetch off the oil they had made, the quantity being more than the fishing ships could bring away. But time and change of circumstances have shifted the situation of this trade. The ships coming in such numbers from Holland, Denmark, Hamburg, and other northern countries, all intruders upon the English, who were the first discoverers of Greenland, the whales were disturbed, and gradually, as other fish often do, forsaking the place, were not to be killed so near the shore as before; but are now found, and have been so ever since, in the openings and space among the ice, where they have deep water, and where they go sometimes a great many leagues from the shore.

The whale-fishery begins in May, and continues all June and July; but whether the ships have good or bad success, they must come away, and get clear of the ice, by the end of August; so that in the month of September at farthest they may be expected home; but a ship that meets with a fortunate and early fishery in May may return in June or July.

The manner of taking whales at present is as follows.—Every ship is provided with six boats, to each of which belong six men for rowing the boat, and an harpooner, whose business is to strike the whale with his harpoon. Two of these boats are kept constantly on the watch at some distance from the ship, fastened to pieces of ice, and are relieved by others every four hours. As soon as a whale is perceived, both the boats set out in pursuit of it, and if either of them can come up before the whale finally descends, which is known by his throwing up his tail, the harpooner discharges his harpoon at him. There is no difficulty in choosing the place where the whale is to be struck, as some have asserted; for these creatures only come up to the surface in order to spout up the water, or *blow*, as the fishermen term it, and therefore always keep the soft and vulnerable part of their bodies above water. A late improvement was made in the method of discharging the harpoon; namely, by shooting it out of a kind of swivel or musketoon: but it doth not appear, that since this improvement was made, the whale-fishing ships have had better success than before.—As soon as the whale is struck, the men set up one of their oars in the middle of the boat as a signal to those in the ship. On perceiving this, the watchman alarms all the rest with the cry of *fall! fall!* upon which all the other boats are immediately sent out to the assistance of the first.

The whale finding himself wounded, runs off with prodigious violence. Sometimes he descends perpendicularly; at others goes off horizontally, at a small depth below the surface. The rope which is fastened to the harpoon is about 200 fathoms long, and properly coiled up, that it may freely be given out as there is a demand for it. At first, the velocity with which this line runs over the side of the boat is so great, that it is wetted to prevent its taking fire: but in a short time the strength of the whale begins to fail, and the fishermen, instead of letting out more rope,

Fishery. strive as much as possible to pull back what is given out already, though they always find themselves necessitated to yield at last to the efforts of the animal, to prevent his sinking their boat. If he runs out the 200 fathoms of line contained in one boat, that belonging to another is immediately fastened to the end of the first, and so on; and there have been instances, where all the rope belonging to the six boats has been necessary, though half that quantity is seldom required. The whale cannot stay long below water, but again comes up to blow; and being now much fatigued and wounded, stays longer above water than usual. This gives another boat time to come up with him, and he is again struck with an harpoon. He again descends, but with less force than before; and when he comes up again, is generally incapable of descending, but suffers himself to be wounded and killed with long lances which the men are provided with for the purpose. He is known to be near death when he spouts up the water deeply tinged with blood.

The whale being dead, is lashed along-side the ship. They then lay it on one side, and put two ropes, one at the head, and the other in the place of the tail, which, together with the fins, is struck off as soon as he is taken, to keep these extremities above water. On the off-side of the whale are two boats, to receive the pieces of fat, utensils, and men, that might otherwise fall into the water on that side. These precautions being taken, three or four men with irons at their feet to prevent slipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capstane or windless. When the fat is all got off, they cut off the whiskers of the upper jaw with an ax. Before they cut, they are all lashed to keep them firm; which also facilitates the cutting, and prevents them from falling into the sea: when on board, five or six of them are bundled together, and properly stowed; and after all is got off, the carcase is turned a-drift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the rest of the crew are employed in slicing them smaller, and picking out all the lean. When this is prepared, they stow it under the deck, where it lies till the fat of all the whales is on board; then cutting it still smaller, they put it up in tubs in the hold, cramming them very full and close. Nothing now remains but to sail homewards, where the fat is to be boiled and melted down into train-oil.

It were in vain to speak in this place of the advantages that may be derived to Great Britain from the whale-fishery. We shall only remark, that the legislature, justly considering that trade as of great national importance, bestowed upon it at different periods very considerable encouragements. In particular, every British vessel of 200 tons or upwards, bound to the Greenland seas on the whale-fishery, if found to be duly qualified according to the act, obtained a licence from the commissioners of the customs to proceed on such voyage: and on the ship's return, the master and mate making oath that they proceeded on such voyage and no other, and used all their endeavours to take whales, &c. and that all the whale-

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whale-fins, blubber, oil, &c. imported in their ship, were taken by their crew in those seas, there was allowed 40s. for every ton according to the admeasure-ment of the ship.

It was afterwards found, however, that so great a bounty was neither necessary to the success of the trade, nor expedient with regard to the public. In 1786, therefore, the acts conferring the said emoluments being upon the point of expiring, the subject was brought under the consideration of parliament; and it was proposed to continue the former measures, but with a reduction of the bounty from 40s. to 30s. In proposing this alteration, it was stated, "that the sums which this country had paid in bounties for the Greenland fishery amounted to L.1,265,461; that, in the last year, we had paid L.94,858; and that, from the consequent deduction of the price of the fish, the public at present paid 60 per cent. upon every cargo. In the Greenland fishery there were employed 6000 seamen, and these seamen cost government L.13, 10s. per man per annum, though we were never able to obtain more than 500 of that number to serve on board our ships of war. Besides, the vast encouragement given to the trade had occasioned such a glut in the market, that it was found necessary to export considerable quantities; and thus we paid a large share of the purchase-money for foreign nations, as well as for our own people, besides supplying them with the materials of several important manufactures." This proposition was opposed by several members, but was finally carried; and the propriety of the measure became very soon apparent. At that time (1786) the number of ships employed from England in the whale-fishery to Davis's Straits and the Greenland seas amounted to 139, besides 15 from Scotland. The proposed alteration took place the next year (1787); and notwithstanding the diminution of the bounty, the trade increased; the number of ships employed the same year from England amounting to 217, and the next year (1788) to 222.

FISHGARD, or FISGARD, a town of Pembrokeshire, situated on a steep cliff on the sea-shore, 254 miles from London, at the influx of the river Gwaive into the sea, which here forms a spacious bay. It is governed by a mayor, a bailiff, and other officers; and here vessels may lie safely in five or six fathoms water. The inhabitants have a good trade in herrings, and annually cure, between Fishgard and Newport, above 1000 barrels of them. The town sends one member to parliament.

FISHING, in general, the art of catching fish, whether by means of nets, of spears, or of the line and hook.

FISHING in the great, performed by the net, spear, or harpoon, for fish that go in shoals, has been explained in the preceding article. That performed by the rod, line, and hook, for solitary fish, is usually termed ANGLING: See that article; and for the particular manner of angling for the different kinds of fish, see their respective names, as DACE, EEL, PERCH, &c. The following were omitted in their order.

1. The *Barbel* *, (so called on account of the bark or beard that is under his chops), though a coarse fish, gives considerable exercise to the angler's ingenuity. They swim together in great shoals, and are at their

worst in April, at which time they spawn; but come soon in season: the places whither they chiefly resort, are such as are weedy and gravelly rising grounds, in which this fish is said to dig and root with his nose like a swine. In the summer he frequents the strongest, swiftest, currents of water; as deep bridges, weirs, &c. and is apt to settle himself amongst the piles, hollow places, and moss, or weeds; and will remain there immoveable: but in the winter he retires into deep waters, and helps the female to make a hole in the sands to hide her spawn in, to hinder its being devoured by other fish. He is a very curious and cunning fish; for if his baits be not sweet, clean, well scoured, and kept in sweet moss, he will not bite; but well-ordered and curiously kept, he will bite with great eagerness. The best bait for him is the spawn of a salmon, trout, or any other fish; and if you would have good sport with him, bait the places where you intend to fish with it a night or two before, or with large worms cut in pieces; and the earlier in the morning or the later in the evening that you fish, the better it will be. Your rod and line must be both strong and long, with a running plummet on the line; and let a little bit of lead be placed a foot or more above the hook, to keep the bullet from falling on it: so the worm will be at the bottom, where they always bite; and when the fish takes the bait, your plummet will lie and not choke him. By the bending of your rod you may know when he bites, as also with your hand you will feel him make a strong snatch; then strike, and you will rarely fail, if you play him well; but if you manage him not dexterously, he will break your line. The best time for fishing is about nine in the morning, and the most proper season is the latter end of May, June, July, and the beginning of August.

2. The *Bleak* †, is an eager fish, caught with all sorts of worms bred on trees or plants; as also with flies, paste, sheep's blood, &c. They may be angled for with half a score of hooks at once, if they can be all fastened on: he will also in the evening take a natural or artificial fly. If the day be warm and clear, there is no fly so good for him as the small fly at the top of the water, which he will take at any time of the day, especially in the evening: but if the day is cold and cloudy, gentles and caddis are the best; about two feet under water. No fish yields better sport to a young angler than the bleak. It is so eager, that it will leap out of the water for a bait.

There is another way of taking bleak, which is by whipping them in a boat, or on a bank-side in fresh water in a summer's evening, with a hazel top about five or six feet long and a line twice the length of the rod. But the best method is with a drabble, thus: Tie eight or ten small hooks across a line two inches above one another; the biggest hook the lowermost, (whereby you may sometimes take a better fish), and bait them with gentles, flies, or some small red worms, by which means you may take half a dozen or more at a time.

3. For the *Bream* ‡, observe the following directions, which will also be of use in carp-fishing.—Procure about a quart of large red worms; put them into fresh moss well washed and dried every three or four days, feeding them with fat mould and chopped fennel, and they will be thoroughly scoured in about three weeks.

Let

* See Cy-
prinus, 2.

† See Cy-
prinus, 5.

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Let your lines be silk and hair, but all silk is the best: let the floats be either swan-quills or goose-quills. Let your plumb be a piece of lead in the shape of a pear, with a small ring at the little end of it: fasten the lead to the line, and the line-hook to the lead, about ten or twelve inches space between lead and hook will be enough; and take care the lead be heavy enough to sink the float. Having baited your hook well with a strong worm, the worm will draw the hook up and down in the bottom, which will provoke the bream to bite the more eagerly. It will be best to fit up three or four rods and lines in this manner, and set them as will be directed, and this will afford you much the better sport. Find the exact depth of the water if possible, that your float may swim on its surface directly over the lead; then provide the following ground bait: take about a peck of sweet gross-ground-malt; and having boiled it a very little, strain it hard through a bag, and carry it to the water-side where you have founded; and in the place where you suppose the fish frequent, there throw in the malt by handfuls squeezed hard together, that the stream may not separate it before it comes to the bottom; and be sure to throw it in at least a yard above the place where you intend the hook shall lie, otherwise the stream will carry it down too far. Do this about nine o'clock at night, keeping some of the malt in the bag; and go to the place about three the next morning; but approach very warily, lest you should be seen by the fish; for it is certain that they have their centinels watching on the top of the water, while the rest are feeding below. Having baited your hook so that the worm may crawl to and fro, the better to allure the fish to bite, cast it in at the place where you find the fish to stay most, which is generally in the broadest and deepest part of the river, and so that it may rest about the midst of your bait that is on the ground. Cast in your second line so that it may rest a yard above that, and a third about a yard below it. Let your rods lie on the bank with some stones to keep them down at the great ends; and then withdraw yourself, yet not so far but that you can have your eye upon all the floats: and when you see one bitten and carried away, do not be too hasty to run in, but give time to the fish to tire himself, and then touch him gently. When you perceive the float sink, creep to the water-side, and give it as much line as you can. If it is a bream or carp, they will run to the other side; which strike gently, and hold your rod at a bent a little while; but do not pull, for then you will spoil all; but you must first tire them before they can be landed, for they are very shy. If there are any carps in the river, it is an even wager that you take one or more of them: but if there are any pike or perch, they will be sure to visit the ground-bait, though they will not touch it, being drawn thither by the great resort of the small fish; and until you remove them, it is in vain to think of taking the bream or carp. In this case, bait one of your hooks with a small bleak, roach, or gudgeon, about two feet deep from your float, with a little red worm at the point of your hook; and if a pike be there, he will be sure to snap at it. This sport is good till nine o'clock in the morning; and, in a gloomy day, till night: but do not frequent the place too much, lest the fish grow shy.

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4. The carp*. A person who angles for carp must arm himself with abundance of patience, because of its extraordinary subtilty and policy: they always choose to lie in the deepest places, either of ponds or rivers, where there is but a small running stream. Fishing.
* See Carps, and Cyprin.

Further, observe, that they will seldom bite in cold weather; and you cannot be too early or too late at the sport in hot weather: and if he bite, you need not fear his hold; for he is one of those leather-mouthed fish that have their teeth in their throat.

Neither must you forget, in angling for him, to have a strong rod and line; and since he is so very wary, it will be proper to entice him, by baiting the ground with a coarse paste.

He seldom refuses the red worm in March, the cad-dis in June, nor the grasshopper in June, April, and September.

This fish does not only delight in worms, but also in sweet paste; of which there is great variety; the best is made of honey and sugar, and ought to be thrown into the water some hours before you begin to angle; neither will small pellets thrown into the water two or three days before be worse for this purpose, especially if chickens cuts, garbage, or blood mixed with bran and cow-dung, be also thrown in.

But more particularly, as to a paste very proper for this use, you may make it in the manner following: Take a sufficient quantity of flour, and mingle it with veal, cut small, making it up with a compound of honey; then pound all together in a mortar till they are so tough as to hang upon the hook without washing off. In order to effect which the better, mingle whitish wool with it; and if you keep it all the year round, add some virgin wax and clarified honey.

Again, if you fish with gentles, anoint them with honey, and put them on your hook, with a deep scarlet dipped in the like, which is a good way to deceive the fish.

Honey and crumbs of wheat-bread, mixed together, make also a very good paste.

In taking a carp either in pond or river, if the angler intends to add profit to his pleasure, he must take a peck of ale-grains, and a good quantity of any blood to mix with the grains, baiting the ground with it where he intends to angle. This food will wonderfully attract the scale-fish, as carp, tench, roach, dace, and bream.

Let him angle in a morning, plumbing his ground, and angling for carp with a strong line: the bait must be either paste or a knotted red worm; and by this means he will have sport enough.

Description of proper Baits for the several sorts of Fish referred to in the annexed Table.

Flies. 1. Stone-fly, found under hollow stones at the side of rivers, is of a brown colour, with yellow streaks on the back and belly, has large wings, and is in season from April to July. 2. Green drake, found among stones by river-sides, has a yellow body ribbed with green, is long and slender, with wings like a butterfly, his tail turns on his back, and from May to Midsummer is very good. 3. Oak-fly, found in the body of an old oak or ash, with its head downwards, is of a brown colour, and excellent from May to September. 4. Palmer-fly or worm, found on leaves of plants, is commonly called a caterpillar, and when it comes to

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a fly is excellent for trout. 5. Ant-fly, found in ant-hills from June to September. 6. The May-fly is to be found playing at the river-side, especially against rain. 7. The black-fly is to be found upon every hawthorn after the buds are come off.

Pastes.] 1. Take the blood of sheeps hearts, and mix it with honey and flour worked to a proper consistence. 2. Take old cheese grated, a little butter sufficient to work it, and colour it with saffron: in winter use rusty bacon instead of butter. 3. Crumbs of bread chewed or worked with honey or sugar, moistened with gum-ivy water. 4. Bread chewed, and worked in the hand till stiff.

Worms.] 1. The earth-bob, found in sandy ground after ploughing, it is white, with a red head, and bigger than a gentle: another is found in heathy ground, with a blue head. Keep them in an earthen vessel well covered, and a sufficient quantity of the mould they harbour in. They are excellent from April to November. 2. Gentles, to be had from putrid flesh: let them lie in wheat-bran a few days before used. 3. Flag-worms, found in the roots of flags; they are of a pale yellow colour, are longer and thinner than a gentle, and must be scowred like them. 4. Cow-turd-bob, or clap-bait, found under a cow-turd from May to Michaelmas; it is like a gentle, but larger. Keep it in its native earth like the earth-bob. 5. Cadis worm, or cod-bait, found under loose stones in shallow rivers; they are yellow, bigger than a gentle, with a black or blue head, and are in season from April to July. Keep them in flannel bags. 6. Lob-worm, found in gardens; it is very large, and has a red head, a streak down the back, and a flat broad tail. 7. Marsh-worms, found in marshy ground: keep them in moss ten days before you use them: their colour is a bluish red, and are a good bait from March to Michaelmas. 8. Brandling red-worms, or blood-worms found in rotten dunghills and tanners bark; they are small red-worms, very good for all small fish, have sometimes a yellow tail, and are called *tag-tail*.

Fish and Insects.] 1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5. Smelt. 6. Yellow frog. 7. Snail slit. 8. Grasshopper.

FISHING-FLY, a bait used in angling for divers kinds of fish. See FISHING.

The fly is either *natural* or *artificial*.

I. *Natural* flies are innumerable. The more usual for this purpose are mentioned in the preceding page.

There are two ways to fish with natural flies; either on the surface of the water or a little underneath it.

In angling for chevin, roach, or dace, move not your natural fly swiftly, when you see the fish make at it; but rather let it glide freely towards him with the stream; but if it be in a still and slow water, draw the fly slowly sidewise by him, which will make him eagerly pursue.

II. The *artificial* fly is seldom used but in blustering weather, when the waters are so troubled by the winds, that the natural fly cannot be seen, nor rest upon them. Of this artificial fly there are reckoned no less than 12 sorts, of which the following are the principal.

1. For March, the dun-fly; made of dun-wool, and the feathers of the partridge's wing; or the body made of black wool, and the feathers of a black drake. 2. For April, the stone-fly; the body made of black wool, dyed yellow under the wings and tail. 3. For the beginning of May, the ruddy fly; made of red wool, and bound about with black silk, with the feathers of a black capon hanging dangling on his sides next his tail. 4. For June, the greenish fly; the body made of black wool, with a yellow list on either side, the wings taken off the wings of a buzzard, bound with black broken hemp. 5. The moorish fly, the body made of dusky wool, and the wings of the blackish mail of a drake. 6. The tawny fly, good till the middle of June; the body made of tawny wool, the wings made contrary one against the other, of the whitish mail of a white drake. 7. For July, the wasp-fly; the body made of black wool, cast about with yellow silk, and the wings of drakes feathers. 8. The steel-fly, good in the middle of July; the body made with greenish wool, cast about with the feathers of a peacock's tail, and the wings made of those of the buzzard. 9. For August, the drake-fly; the body made with black wool cast about with black silk; his wings of the mail of a black drake, with a black head.

The best rules for artificial fly-fishing are,

1. To fish in a river somewhat disturbed with rain; or in a cloudy day, when the waters are moved by a gentle breeze: the south wind is best; and if the wind blow high, yet not so but that you may conveniently guard your tackle, the fish will rise in plain deeps; but if the wind be small, the best angling is in swift streams. 2. Keep as far from the water-side as may be; fish down the stream with the sun at your back, and touch not the water with your line. 3. Ever angle in clear rivers, with a small fly and slender wings; but in muddy places, use a larger. 4. When, after rain, the water becomes brownish, use an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c. 5. Let the line be twice as long as the rod, unless the river be encumbered with wood. 6. For every sort of fly, have several of the same, differing in colour, to suit with the different complexions of several waters and weathers. 7. Have a nimble eye, and active hand, to strike presently with the rising of the fish; or else he will be apt to spue out the hook. 8. Let the fly fall first into the water, and not the line, which will scare the fish. 9. In slow rivers, or still places, cast the fly across the river, and let it sink a little in the water, and draw it gently back with the current.

Salmon-flies should be made with their wings standing one behind the other, whether two or four. This fish delights in the gaudiest colours that can be; chiefly in the wings, which must be long, as well as the tail.

FISHING by means of birds, a method peculiar to the Chinese, who train certain birds for the purpose in the same manner as falcons are taught to pursue game. See CYPRINUS; and CHINA, n^o 121.

FISHING-FLOATS, are little appendages to the line, serving to keep the hook and bait suspended at the proper depth, to discover when the fish has hold of them, &c. Of these there are divers kinds; some made

An Epitome of the whole art of FISHING, wherein is shown (at one view), the harbours, seasons, and depths, for catching all sorts of fish usually angled for; also the various baits for each, so digested as to contain the essence of all the treatises ever written on the subject, exempt from the superfluities, which tend more to perplex than instruct.

Names.	Where found.	Season.	Time to ang.	Depth from ground.	Proper Baits.			Fish and Insects. N ^o 8.
					Flies. N ^o	Pastes. N ^o	Worms. N ^o	
Bream	rough str. river or mid. pond	April to Mich.	Sun-rise to 9 3 to Sun-set	touch ground	—	1 3	1 to 7	—
Barbel	gravel-banks in currents under bridges	April to Aug.	very early or late all day	ditto	—	2	2 6 7	—
Bleak	fandy bottom, deep rivers, ships sterns	May to Oct.	—	6 inches from bottom	1 2	2	2 3 8	—
Carp	still deep mud-bottom, pond or river	May to Aug.	Sun-rise to 9 3 to Sun-set	3 inches from bottom hot weather, mid-water	—	1 3 4	1 2 3 4 7	—
Chub or } Chevin } Dace }	ditto	May to Dec.	ditto	ditto	1 to 5	2	1 2 4 5	7 8
Gudgeon	fandy bottom, deep rivers, ships sterns	May to Oct.	all day	6 to 12 inches from bottom	ditto	3 4	1 to 5 & 8	—
Pike	gravel shoals near clay-banks	May to Oct. All the year.	ditto ditto	near or on ground mid-water	wh. flo. and snap	ditto line float hook fixt	2 8	—
Pearch	river in stream } gravel or weedy pond deepest part } bottom	May to Aug. Aug. to May. May to Oct. May to Oct.	S.-rise to 10 2 to Sun-set mid-day all day ditto	ditto	2	1	3 5 7 8	1 6
Pope	deep holes in rivers	—	—	6 inches from bottom	5	—	all	—
Roach	fandy bottom, deep rivers, ships sterns	—	—	ditto	1 2 4 5	3 4	ditto	8
Salmon	deep rivers	Mar. to Sept.	8 to 9, 3 to 6	mid-way to the bottom	all large	—	1 5 6 7	1
Smelts	ships sterns and docks	Apr. to Oct.	all day	mid-way to the bottom variable	all small	—	1 2 5	bits of fmetls
Trout	purling stream and eddies of stony bottom river	Mar. to Mich.	ditto	cold weather, 6 inches to 9 hot weather, top to mid-wat.	1 to 5	—	1 2 5 to 8	1 8
Tench	mud-bottom river or pond	All the year.	Sun-rise to 9 3 to Sun-set	3 inch. from bot. hot weather mid-water	—	1 3 4	1 3 4 to 7	—
Umber or } Grayling }	clay bottom, swift stream	All the year.	all day	cold weather, 6 to 9 inches hot weather, top to mid-wat.	1 to 5	—	all	1 8

Sports. Dis.

made of Muscovy-duck quills, which are the best for slow waters; but for strong streams, found cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable: pare the cork to a pyramidal form, and make it smooth

N^o 127.

FISHING-Hook, a small instrument made of steel-wire, of a proper form to catch and retain fish.

The fishing hook, in general, ought to be long in the shank, somewhat thick in the circumference, the point even and straight; let the bending be in the shank.

For

Fishing.
Fistulae.

For setting the hook on, use strong, but small silk, laying the hair on the inside of your hook; for if it be on the outside, the silk will fret and cut it asunder.

There are several sizes of these fishing-hooks, some big, some little: and of these, some have peculiar names; as, 1. Single hooks. 2. Double hooks; which have two bendings, one contrary to the other. 3. Snappers, or goigergs, which are the hooks to whip the artificial fly upon, or bait with the natural fly. 4. Springers, or spring hooks; a kind of double hooks, with a spring, which flies open upon being struck into any fish, and so keep its mouth open.

FISHING-Line, is either made of hair twisted; or silk; or the Indian grafs. The best colours are the sorrel, white, and grey; the two last for clear waters, the first for muddy ones. Nor is the pale watery green despicable; this colour is given artificially, by steeping the hair in a liquor made of alum, foot, and the juice of walnut-leaves, boiled together.

FISHING-Rod, a long slender rod or wand, to which the line is fastened, for angling.—Of these there are several sorts; as, 1. A troller, or trolling-rod, which has a ring at the end of the rod, for the line to go through when it runs off a reel. 2. A whipper, or whipping-rod; a top-rod, that is weak in the middle, and top heavy, but all slender and fine. 3. A dropper; which is a strong rod and very light. 4. A snapper, or snap-rod; which is a strong pole, peculiarly used for the pike. 5. A bottom-rod; being the same as the dropper, but somewhat more pliable. 6. A sniggling or procking stick; a forked stick, having a short strong line, with a needle, baited with a lobe worm: this is only for eels in their holes.

FISHING-Frog, or Angler. See *LOPHIUS*.

Right of FISHING, and property of fish. It has been held, that where the lord of the manor hath the soil on both sides of the river; it is a good evidence that he hath a right of fishing; and it puts the proof upon him who claims *liberam piscariam*: but where a river ebbs and flows, and is an arm of the sea, there it is common to all, and he who claims a privilege to himself must prove it; for if the trespass is brought for fishing there, the defendant may justify, that the place where is *brachium maris, in quo unusquisque subditus domini regis habet et habere debet liberam piscariam*. In the Severn the soil belongs to the owners of the land on each side; and the soil of the river Thames is in the king, but the fishing is common to all. He who is owner of the soil of a private river, hath *separalis piscaria*; and he that hath *libera piscaria*, hath a property in the fish, and may bring a possessory action for them; but *communis piscaria* is like the case of all other commons. One that has a close pond in which there are fish, may call them *pisces suos*, in an indictment, &c. but he cannot call them *bona & catalla*, if they be not in trunks. There needs no privilege to make a fish-pond, as there doth in the case of a warren. See *FRANCHISE*.

FISSURES, in the history of the earth, certain interruptions, that in an horizontal or parallel manner divide the several strata of which the body of our terrestrial globe is composed.

Fissure of the Bones, in surgery, is when they are divided either transversely or longitudinally, not quite through, but cracked after the manner of glass, by any external force. See *SURGERY*.

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FISTULA, in the ancient music, an instrument of the wind-kind, resembling our flute or flageolet.

The principal wind-instruments of the ancients, were the tibia and the fistula. But how they were constituted, wherein they differed, or how they were played upon, does not appear. All we know is, that the fistula was at first made of reeds, and afterwards of other matters. Some had holes, some none; some again were single pipes; others a combination of several; witness the *lyringa* of Pan.

FISTULA, in surgery, a deep, narrow, and callous ulcer, generally arising from abscesses.

It differs from a *sinus*, in its being callous, the latter not. See *SURGERY*.

FISTULA, in farriery. See *FARRIERY*, Sect. xxxii.

FISTULARIA or *TOBACCO-PIPE FISH*; a genus of fishes, belonging to the order of abdominales. Of this genus Linnæus reckons two species; but we have a description only of one, viz. the *tabacaria*. It is described by Mr. Catelby, from the only one he ever saw. It was almost a foot in length; the fore-part from the nose to half-way the body of nearly equal bigness; from whence it grew tapering to the tail, which was forked, and from which grew a slender taper whip, four inches long, of the consistence of whalebone; the mouth narrow, from which to the eyes was almost three inches. The whole fish was of a brown colour. They are sometimes taken on the coasts of Jamaica.

FIT. See *PAROXYSM*.

Dr Cheyne is of opinion that fits of all kinds, whether epileptic, hystERIC, or apoplectic, may be cured solely by a milk-diet, of about two quarts of cows milk a-day, without any other medicine.

FITCHES, in husbandry, a sort of pulse, more generally known by the name of *chick-pea*. See *CICER*.

Fitches are cultivated either for feeding cattle, or improving the land. They make a wholesome and nourishing food, whether given in the straw or threshed out. When sown only to improve the soil, they are ploughed in just as they begin to blossom, by which means a tough stiff clay-soil is much enriched.

FITCHET, a name used in some places for the weasel, called also the *foumart*. See *MUSTELA*.

FITCHY, in heraldry, (from the French *fixé*, i. e. fixed); a term applied to a cross when the lower branch ends in a sharp point: and the reason of it Mackenzie supposes to be, that the primitive Christians were wont to carry crosses with them wherever they went; and when they stopped on their journey at any place, they fixed those portable crosses in the ground for devotion's sake.

FITZ, makes part of the surname of some of the natural sons of the kings of England, as *Fitz-roy*; which is purely French, and signifies the "king's son."

FITZHERBERT (Sir Anthony), a very learned lawyer in the reign of king Henry VIII. was descended from an ancient family, and born at Norbury in Derbyshire. He was made one of the judges of the court of common-pleas in 1523; and distinguished himself by many valuable works, as well as by such an honourable discharge of the duties of his office, as made him esteemed an oracle of the law. His writings are, *The Grand Abridgment*; *The Office and Authority of Justices of Peace*; *the Office of Sheriffs, Bailiffs of Liberties, Escheators, Constables, Coroners, &c.*; *Of the Diversity of*

M m

Courts;

Fistula
Fitzherbert.Plate
CXCVI.Jacob's Law
Dist.

Fitz-stephen *Courts; The New Natura Brevium; Of the Surveying of Lands; and The Book of Husbandry.* He died in 1538.

Fixed Air.

FITZ-STEPHEN (William), a learned monk of Canterbury, of Norman extraction, but born of respectable parents in the city of London. He lived in the 12th century; and being attached to the service of archbishop Becket, was present at the time of his murder. In the year 1174, he wrote in Latin, *The Life of St Thomas, archbishop and martyr*; in which, as Becket was a native of the metropolis, he introduces a description of the city of London, with a miscellaneous detail of the manners and usages of the citizens: this is deservedly considered as a great curiosity, being the earliest professed account of London extant. Fitz-Stephen died in 1191.

FIVES, or VIVES. See FARRIERY, Sect. xiv. 2.

FIXATION, in chemistry, the rendering any volatile substance fixed, so as not to fly off upon being exposed to a great heat: hence,

FIXED BODIES, are those which bear a considerable degree of heat without evaporating, or losing any of their weight. Among the most fixed bodies are diamonds, gold, &c. See **DIAMOND, GOLD, &c.**

FIXED, or *Fixable Air*, an invisible and permanently elastic fluid, superior in gravity to the common atmospheric air and most other aerial fluids, exceedingly destructive to animal life; produced in great quantities, naturally from combustible bodies, and artificially by many chemical processes. From its apparently acid properties it has obtained the name of *aerial acid*, *cretaceous acid*, and *carbonic acid*; from its noxious qualities, it has been called *mephitic air*, or *mephitic gas*; and, from the circumstance of being produced in vast quantities during the combustion of charcoal, it first obtained from Van Helmont the name of *gas sylvestre*. The term *fixed air* has been given from its property of readily losing its elasticity, and fixing itself in many bodies, particularly those of the calcareous kind; and though some objected to the propriety of the term, the fluid in question is so well known by the name of fixed air, that we choose still to retain it.

The nature and properties of fixed air are explained under the article **AEROLOGY**. It is there considered as an acid, and the reasons for supposing it to be composed of phlogiston and dephlogisticated air are set forth. In a paper of the Manchester Transactions by Mr Delaval on the permanent colours of opaque bodies, he considers the nature of fixed air, and gives an account somewhat different. He denies its acid property, which has been generally looked upon as so well ascertained. "The change of colour produced in vegetable juices by the electric spark (says he), is adduced as a proof of the acidity of fixed air; but it has been already shown, that this does not arise from acid, but phlogistic matter*." The acid quality of fixed air is also generally inferred from its power of dissolving iron. But phlogiston is also a solvent of iron. Thus a considerable portion of that metal is always dissolved and held in solution by the phlogisticated alkaline lixivium, which consists of inflammable matter calcined with fixed alkali. M. Margraaf has shown, that several other metals are soluble in this lixivium. Hence it is evident, that the solubility of iron does not prove

Mr Delaval's theory of fixed air.

* See *Chromatics*, 2^o 31.

the acidity of the solvent, but may arise from the phlogiston contained in it.

Fixed Air.

"Fixed air is also supposed to be an acid, by diminishing the causticity and promoting the crystallization of fixed alkalies: but this hypothesis does not agree with the effects which are produced by the combination of acids with alkalies. By these combinations neutral salts are produced; but alkalies do not become neutral by combination with fixed air, being only changed by such an union from caustic and deliquescent to mild and crystallizable alkalies: whence it is evident, that the alteration in them produced by fixed air is not to be attributed to the introduction of an acid.

"We must therefore (continues our author) turn our eyes to the consideration of some other principle by which these effects may be produced; and this principle appears to be phlogiston. The phlogisticated alkaline lixivium is perfectly mild when saturated; and by a slight evaporation is reduced to a concrete crystalline mass, which does not deliquesce or imbibe the least moisture from the air, and no longer retains any alkaline character or property. M. Beaumé, by an elegant and ingenious experiment, has proved the presence of phlogiston in mild alkalies; and has shown, that their power of crystallizing depends upon their union with that principle. He heated in a silver vessel a lixivium of mild alkali, which imparted to the silver a covering or coating of inflammable matter, by which its surface was tarnished and became black. The lixivium was several times poured out of the silver vessel; and after the surface of the metal had been freed from the tarnish, the lixivium was replaced in it, and again heated, by which the tarnish was renewed. This was repeated till the lixivium no longer communicated any stain to the silver. The causticity of the lixivium increased in proportion as it imparted its phlogiston to the silver; and at the end of the process the alkali became perfectly caustic and incapable of crystallizing.

"Those instances, and many others which might be adduced, seem to prove that the change which fixed air produces in caustic alkalies is not effected by acid but phlogistic matter. It is certain, that the matter communicated to lime by fixed air is the very same which it imparts to alkalies: for it may be transferred, unchanged, from one of these substances to another; and when united to either of them, still retains the same qualities. Therefore, if phlogiston renders alkalies mild, and effects their crystallization, the same principle also precipitates lime, and in like manner restores it to its state of mild calcareous earth.

"The experiments and observations on which Dr Black has established his comprehensive and consistent theory, clearly prove, that lime is precipitated from lime-water by fixed air; but his views were not extended to an investigation of the particular matter or quality whereby fixed air operates that effect.

"Lime, which has been precipitated from lime-water, and restored to the state of a mild calcareous earth, is again soluble by the addition of a larger proportion of fixed air; which has been considered as an additional proof of the acidity of the latter. It has also been considered as an extraordinary circumstance, that two such opposite effects should be produced by the same substance.

The

Fixed Air. The simplicity observed by nature in her operations, however, will not allow us to suppose that fixed air is possessed of two different or opposite qualities, by one of which it precipitates, and by the other it dissolves. The precipitation of lime from lime-water, and its resolution, are effected by an equable uniform action, exercised by one and the same principle, which is a constituent and essential part of fixed air. Such a precipitation and resolution are not extraordinary or complex phenomena, as has been thought, but are analogous to the ordinary and constant effects which arise from chemical affinities. This may be exemplified by any compound which assumes a concrete and solid consistence by its union with a given quantity of fluid, and which by the addition of a larger quantity of the same fluid is reduced to a liquid state. Thus, when a due proportion of water is added to iron and vitriolic acid, a mutual attraction takes place between these three ingredients, by means of which they are united; and, by their combination, a concrete vitriol or metallic salt is formed. But if a greater quantity of water be added to this concrete salt, as the mutual attraction after this addition subsists equally between the vitriolic salt and the whole mass of water, the acid and ferruginous particles are more minutely divided, and diffused uniformly throughout every part of the water. Thus the solid concrete salt is resolved, and a vitriolic liquor is formed, in which the water predominates.

"Lime strongly attracts and unites with inflammable substances, as sulphur, camphor, and resins. Fixed air has a still greater affinity with it; because, in all the more gross substances, the phlogiston is allayed with salt, earth, and other matters: but in fixed air it exists in a purer, and consequently a more active state.

"As alkalies are rendered mild or caustic by the presence or absence of the inflammable principle, it can hardly be doubted that the difference between mild and calcareous earth and quicklime is also occasioned by a communication or deprivation of the same principle.

"The origin of fixed air seems to prove its phlogistic nature; for all bodies which yield it, yield also inflammable matter, but many of them do not yield any acid. Calcareous spar, magnesia, and alkaline salts, send forth fixed air; and all these substances, by the loss of it, are deprived of their inflammable contents. Diamonds, exposed to the focus of a burning glass under a receiver, impart to the air contained in it a power of precipitating lime from lime-water when it is agitated with it: But it does not appear that any acid can be derived from these bodies.

"Some of the properties of fixed air are consistent with either the character of an acid or phlogiston. Such are, its power of altering the colour of vegetable juices; its affinity to alkalies, and ready union with lime; its power of dissolving iron, which is instanced in all acids, and likewise in the phlogisticated alkaline lixivium. The antiseptic quality prevails equally in acids and in inflammable spirits. Acids are disengaged from substances which are decomposed by stronger acids; phlogiston is likewise expelled from bodies which dissolved in acids.

"The qualities of acid and phlogiston agree in these and several other instances; but fixed air is endowed

with properties which are peculiar to phlogiston: such as its power of effecting the crystallization of alkalies without changing them to neutral salts; its tendency to escape from water; and its affinity with the air, by means of which a considerable quantity of fixed air is united with and diffused throughout every part of the atmosphere.

"Water, as well as phlogiston, is a constituent part of all substances which yield fixed air. Both these principles have a strong affinity to air. This appears from the union which air forms with the inflammable principle when it is disengaged from bodies by combustion, fermentation, putrefaction, or any other mode of decomposition; and from the mutual attraction of water and air, which is manifested by evaporation, and by the constant presence of aqueous particles in the atmosphere.

"The laws of chemical analysis will hardly permit us to doubt that the air which is obtained from mild alkalies, calcareous earth, and various other substances, receives from them, when they are decomposed, the same contents which were united in them as constituent parts while they were in their entire state; and their analysis invariably shows, that air, water, and phlogiston, enter their composition.

"Hence it seems to follow, that fixed air consists of these three ingredients, either united in bodies, and discharged from them already combined, or that it is formed in the atmosphere by the concurrence and union of these principles: and the phenomena both of fixed and phlogisticated air may be solved by the action and properties of these ingredients.

"The weight of fixed air indicates that it contains a considerable portion of aqueous matter; and it is by means of this constituent principle that it is miscible with water, in like manner as ardent spirits are, notwithstanding their inflammable nature.

"Phlogistic matters are miscible with water only in proportion as they contain a quantity of the aqueous principle in their composition. When the relative proportion of this constituent principle is less than that of the phlogiston combined with such matters, they are either immiscible with water, or miscible only in part. Thus, spirit of wine unites with water in all proportions. Ether, which is spirit of wine deprived of part of its water by means of the vitriolic acid, is not miscible with water in all proportions; but ten parts of water are requisite to the absorption of one part of ether. Oil, which has still less water in its composition, does not in any degree mix with water. Resinous substances do not combine with water, because their aqueous part is not in sufficient quantity to serve as a medium for the union of their phlogiston. In gums the relative proportion of phlogiston is much less than in resins, and that of the water is much greater; and, by the intervention of their aqueous part, gums are readily miscible with water. Resins, when united with a due proportion of gum, are by its mediation also rendered soluble in water. But if a less proportion of the gum be joined with the resin, only a part of the compound resulting from this union is disposed to mix with water, and a residuum is left which is incapable of being dissolved in any aqueous liquor.

Fixed Air. "Fixed air seems to resemble those matters which do not possess a sufficient quantity of aqueous matter to render them totally soluble in water; for after a given portion of fixed air has been imbibed by water, a residuum remains which is incapable of being absorbed by it, and is called *phlogisticated air*. This air may be formed from fixed air, not only by the subtraction of water, but by the addition of the inflammable principle; as when phlogiston is communicated to fixed air by electric sparks, or the vapours disengaged from a mixture of sulphur and iron-filings.

"The origin of phlogisticated air, shows that its difference from fixed air consists chiefly in the deficiency of water. Hence, as metals contain no water, the phlogiston which arises from them during calcination produces no fixed but phlogisticated air. But vitriols, and all other saline matters, containing water as a constituent part, yield fixed air. Calces of metals also, which have received aqueous matter in the process of their calcination, as white-lead and other calces, which have absorbed water, together with the air, from the atmosphere, yield also fixed air. The fermentation and putrefaction of animal and vegetable substances is effected by means of their moisture, and therefore fixed air is produced in these processes. It is more effectually produced by respiration than by many other phlogistic processes, in consequence of the copious supply of the aqueous as well as the phlogistic principle, which the air receives from the lungs.

"Fixed air may be formed from vegetable acids; but when it is thus constituted, it does not differ from that which is produced from alkalies, magnesia, and other substances which yield no acid. It is therefore evident, that in each of these instances it is formed by the combination of some principles which are common to all those substances. These principles are water and phlogiston. In vegetable acids, the phlogiston combined with the water is equal in quantity to that which constitutes the inflammable part of spirit of wine; for radical or concentrated vinegar is totally inflammable. The acid state of vegetable matters is not essential to them, nor is it requisite to the production of fixed air from them; for fixed air is producible from recent plants. Hence it appears, that in their acid, as well as in their recent, vinous, or putrefactive state, they yield fixed air by means of their aqueous and phlogistic principles.

"All fixed air, from whatever subject it may be procured, or to whatever bodies it is transferred, consists constantly and invariably of the same materials, combined in the same proportions; otherwise it could not restore lime, caustic alkalies, &c. to their original mild state; because these substances cannot be recomposed but by the same proportion of their constituent principles which they contained before their decomposition. Thus, lime cannot be restored to the state of mild calcareous earth by water or by pure dephlogisticated air, because each of these principles consists only of one of the three ingredients which are requisite for that purpose. Nor can the recomposition of calcareous earth be effected by phlogisticated air, because it contains an excess of phlogiston and a defect of water. Compounds formed of such ingredients as do not contain a requisite quantity of the principles

necessary to constitute fixed air, may acquire a due proportion of them by an addition of the ingredients in which they are deficient. Pure dephlogisticated air is reduced to fixed air by the communication of aqueous and phlogistic vapours disengaged from bodies by various processes: these principles have a great affinity to air, and readily combine with it. Phlogisticated air, when agitated with water, receives into its composition a quantity of aqueous particles sufficient to constitute it fixed air; and by that means it becomes capable of precipitating lime from lime-water. If the analysis and recomposition of calcareous earth be ever so often repeated, its analysis will always yield, and its recomposition will always require, the same relative quantities of air, water, and phlogiston. Fixed air therefore seems to consist of these three principles invariably and constantly combined in the same proportions. It has been frequently considered as a mere compound of air and phlogiston; but such a compound seems to approach nearer in its nature to phlogisticated air, as it is deficient in one of the principles which is essential to fixed air."

On this account of fixed air it may be observed, that notwithstanding all our author's arguments, there is no positive proof adduced against the acidity of fixed air. It is not certainly known whether mere phlogiston will perfectly neutralize alkalies. The colouring matter of Prussian blue indeed will certainly do so: but this is not pure phlogiston, but a compound of different substances; and besides, the alkalies neutralized by it differ very considerably from those rendered neutral by fixed air. Before we can attribute the effects of fixed air to mere phlogiston, therefore, it would be necessary to form out of a caustic alkali, by means of pure phlogiston, a salt exactly resembling mild alkali produced by the union of the same caustic salt with fixed air; so that it shall not only have the same taste and other external properties, but likewise emit fixed air upon the addition of a mineral acid. But by no experiment have we yet been able to effect this. It is absolutely necessary that the invisible and unknown substance called by Lavoisier the *oxygeneous principle*, by others the *basis of dephlogisticated* or *vital air*, should be united to the inflammable matter, in order to the formation of the fixed air: and as this basis is likewise found to be necessary to the formation of every acid, or at least to those of the mineral kind, we have equal reason to call fixed air an acid while it displays the properties of one.

That water is an essential ingredient in the composition of fixed air as well as all other kinds of aerial vapours, is not to be doubted; but we are by no means certain whether the difference between fixed and phlogisticated air consists in the want of water in the latter. The specific gravity here cannot be any rule for us to judge of the matter: for inflammable air, the lightest of all the kinds hitherto known, cannot be produced without a certain proportion of water; and by some processes fixed air may be converted into inflammable as well as phlogisticated air.

The noxious properties of fixed air are well known, and are too often fatally experienced by the miners, who have given it the appellation of the *choke-damp*, air on a Manchester Transactions, however, we have an account of the effects of this person long exposed to it.

Fixed Air. account of one who continued seven days below ground, not only exposed to the effects of this gas, but without any kind of sustenance; notwithstanding which, he was taken out alive. When first found in the pit, the sides of which had fallen in and confined him for the time above mentioned, his eyes were so swollen and protruded out of their sockets, that he had a shocking appearance; for which reason, the people tied a handkerchief round his head. While in this protruded state, however, he was capable of distinguishing objects; but in a little time his eyes sunk within their sockets, and he became quite blind. On being taken out of the pit, he seemed for some time to be in a way of recovery; but all favourable symptoms soon vanished, and he expired in three days after his release.

During all the time of his confinement he had only a space to breathe in of three yards in length and two in breadth, in which he lay upon his belly. It communicated indeed with another pit by a passage 80 yards in length and about eight or ten inches wide; but as the mouth of the pit into which he descended was stopped, and the body of earth through which he had dug thrown behind him, no circulation of air could possibly take place. The truth of this conclusion was likewise evinced by the state of the air in the other pit through which the people entered to dig out the unfortunate sufferer; for it was there so foul, that the candles they carried down with them were immediately extinguished. In this state of the air which surrounded him, it is remarkable, that the patient, who was naturally asthmatic, breathed freely, and continued to do so till his death: And on this subject Dr Percival makes the following remarks.

“As he had been long asthmatic, we may reasonably conclude from his suffering so little, that the commonly received opinion of the *suffocating* nature of the mephitic or choke-damp, that it destroys the elasticity of the air, and occasions a collapse of the lungs, is without foundation, notwithstanding all the respectable authorities that may be advanced in support of it. Indeed, from the phenomena which attend the extinction of life in those to whom such vapours have proved mortal, it is evident that the poison acts chiefly on the nervous system. The vital principle seems to be arrested and almost instantaneously destroyed; sometimes even without a struggle, and possibly without any antecedent pain. Pliny the elder was found, after the fatal eruption of Mount Vesuvius, exactly in the posture in which he fell, with the appearance of one asleep rather than dead. Some persons killed by foul air in a cellar at Paris, were found stiff as statues, with their eyes open, and in the posture of digging. M. Beaumé relates the history of a man who was recovered from apparent death produced by a similar cause, and who asserted that he had neither felt pain nor oppression; but that at the point of time when he was losing his senses, he experienced a delightful kind of delirium. This account receives some confirmation from what Dr Heberden says in his lectures on poisons, that he had seen an instance in which the fumes of charcoal brought on the same kind of delirium that is produced by henbane and other intoxicating poisons of the vegetable kind. Abbé Fontana breathed a certain portion of inflammable air, not

only without inconvenience, but with unusual pleasure. He had a facility in dilating the breast, and never felt an equally agreeable sensation even when he inhaled the purest dephlogisticated air. But he suffered greatly in a subsequent experiment: for having filled a bladder, containing about 350 cubic inches, with inflammable air, he began to breathe it boldly after discharging the atmospheric air contained in his lungs by a violent expiration. The first inspiration produced a great oppression; towards the middle of the second, he was observed to become very pale, and objects appeared confused to his eyes: nevertheless he ventured on a third; but his strength now failed, so that he fell upon his knees, and soon afterwards upon the floor. His respiration continued to be effected with pain and difficulty, and he did not perfectly recover till the succeeding day. In this instance some degree of palsy was probably induced in the nerves of the lungs by the action of concentrated inflammable air conveyed into the vessels forcibly emptied of their atmospheric air by expiration. For, in ordinary respiration, about 35 inches of air are inhaled and exhaled; but in a violent expiration, about 60 cubic inches may be discharged. In the case of the unfortunate collier (Travis), it will be remembered, that the air was sufficiently salubrious when he went down into the pit; that by stagnation it became gradually noxious; and that his nervous system must therefore have been progressively habituated to its influence. This is conformable to the observations of Dr Priestley; who found, that if a mouse can bear the first shock of being put into a vessel filled with artificial gas, or if the gas be increased by degrees, it will live a considerable time in a situation that would instantly prove fatal to other mice: and he frequently noticed, that when a number of mice had been confined in a given quantity of infected air, a fresh mouse introduced among them has immediately died in convulsions.

“It has been found by experiment, that the fumes emitted by almost every species of burning fuel prove fatal to animals, when applied in a sufficiently concentrated state. I have computed, that 300 tons of coal are every day consumed in the town of Manchester during the winter season. The factitious gas generated by its consumption must amount to at least a third part of that quantity; it is probable that the smoke proceeding from it constitutes another third part; and both together are capable of occupying a space of very wide extent. Now, if it were not for the dispersion of these vapours by the wind, the precipitation of them by rain, and the influence of other causes, respiration could not be carried on in such circumstances. And we may observe, that frosty weather, which is generally serene and without wind, proves extremely oppressive, and sometimes even fatal, to asthmatic patients, especially in great cities. Indeed the rate of human mortality is nearly in proportion to their magnitude and population. It is evident, therefore, that habit, however it may abate, cannot entirely counteract the baneful effects of bad air; and those will feel its effects the more strongly, in every situation, whose nervous systems are endowed with more than ordinary sensibility. Such persons I would caution not to indulge their curiosity in the inspection of unwholesome manufactures, nor in visiting mines, caverns, stoves,

Fixed Air. stoves, hospitals, or prisons. The late Dr Brown suffered very severely by accompanying two foreigners of distinction into the duke of Bridgewater's works at Worsley. It happened that they were the first who entered the tunnel on that day. The candles which they carried with them were observed to burn very dimly; but neither the passengers nor the boatmen experienced any difficulty in respiration. After remaining in the coal-pits a considerable time, they proceeded to Warrington, where Dr Brown was attacked by violent pains, which shifted suddenly from one part of his body to another; small purple spots overspread his skin; his throat became tumefied so as to render swallowing difficult; and great prostration of strength, with a low fever, ensued. The doctor was subject to the anomalous gout; had once a paralytic complaint of long continuance; and hence we may conclude that his nervous system was endowed with peculiar irritability. He was not, however, the only sufferer; for one of the foreigners was affected with similar petechiæ, but attended with little pain or disorder."

In what manner the atmosphere may be purified from too great a quantity of fixed air.

Here we may observe, that our knowledge of the composition of fixed air seems to throw some light upon the subject in question. Dephlogisticated air and phlogiston are universally allowed to be the component parts; and whether we suppose, with Mr Delaval, water to be a third ingredient or not, the case will still be the same; for by whatever means the separation of the phlogiston can be effected, the air will be rendered pure. This is ascertained by some of Dr Priestley's experiments, particularly those related under the article AEROLOGY, n° 113. where the phlogiston was plainly separated by the electric spark, and the dephlogisticated air remained in a state of purity. When the atmosphere is contaminated by a mixture of fixed air, therefore, it may be purified in two very different ways: one is by the absorption of the gas without any decomposition, as by lime-water, alkaline salts, &c. the other, by the separation of its component parts, by which a portion of it must necessarily be exchanged for a portion of pure respirable air. It is probable that nature pursues both these methods in freeing the atmosphere from this noxious gas: but indeed, whatever method she takes, it is certain that any large portion of atmospheric air cannot long be contaminated with this gas, even though seemingly in a confined situation. This is evident from some experiments, where large quantities of fixed air being poured out into the atmosphere of a room, entirely vanished, so that it could not be perceived by the nicest test, in half an hour. As we are not yet acquainted with the action of atmospheric and fixed air upon each other, when the former is in large proportion, it naturally becomes a matter of suspicion whether the fixed air has not a natural tendency to decomposition, and consequently to render the air salutary after it has for a short time rendered it noxious. This is certainly the case when it meets with vegetables; for many of them are supported by every kind of noxious air. In cases where many animals are confined together, it is probable that their death is not occasioned by the *fixed air* produced from their respiration, but by that which is called *phlogisticated*, or most probably by the total deprivation of the vital principle supplied by the de-

phlogisticated kind. The perspiration of animal bodies of itself supplies a resource for the absorption of pure fixed air; for all animal exhalations are of the alkaline kind, and therefore are capable of neutralizing this kind of gas. This is evident from a circumstance generally unnoticed, but which is obvious to every one who chooses to give himself the trouble of inquiry. In washing over the walls of rooms with lime and water, which is the first preparatory operation for painting, a violent smell of volatile alkali is perceptible; and there can be no doubt that this proceeds from a decomposition of the neutral salt formed by the union of the fixed air, produced in respiration, with the subtle phlogistic and alkaline effluvia which rise in perspiration. To this cause we may in a great measure ascribe the preservation of the Russians, which Dr Percival also takes notice of, but ascribes it to an *accommodating* quality of the human frame by which it can subsist in so great a variety of circumstances. "A Russian boor (says he), in the winter season, experiences all the varieties of air, heat, and cold, without any inconvenience. When labouring out of doors, he is exposed to the intensity of frost and snow; when he retires in the evening to his hut, which consists only of one close apartment, never ventilated during six months, he feeds upon salted fish or flesh, and afterwards reposes on a greasy mattrass placed over an oven in which billets of wood are burned. In this situation he is literally stewed, with his whole family, who live in a constant steam, not offensive to themselves, but scarcely supportable by a stranger. The atmosphere of a crowded town must, in many respects, resemble the foul air of a Russian cottage; yet thousands enjoy in it a considerable share of health."

On this we must further observe, that in certain cases the human body requires much more of the vital principle supplied by dephlogisticated air to support life than in others. This is particularly the case when much motion and exercise are used; so that the computations made of the quantity of air consumed by a human creature in a minute, must be very vague and variable. This was evident in M. Saussure's journey to the top of mount Blanc, where, besides the general rarefaction of the atmosphere, there was a great mixture of fixed air, as appeared by the precipitation of lime-water when exposed to the action of the common air. Here, though always somewhat uneasy, yet he was comparatively well while he remained in a state of inaction; but felt excessive trouble on being obliged to exert his strength, inasmuch that he could scarce accomplish in four hours and an half, the experiments which at the foot of the mountain he would have easily done in three. "While I remained perfectly still (says he), I experienced but little uneasiness, more than a slight oppression about the heart; but on the smallest bodily exertion, or when I fixed my attention upon any object for some moments together, particularly when I pressed my chest in the act of stooping, I was obliged to rest and pant for some minutes."

From this account we must naturally conclude, that in cases where the powers of life and circulation are strong and vigorous, a great quantity of vital principle is requisite to support life; and the sudden deprivation of any considerable part of it may occasion death, even though

Of the quantity of vital principle requisite for the support of man life in different situations

though as much still remain as would be sufficient to support life in other circumstances. Hence, if a strong and healthy animal is suddenly plunged into an atmosphere loaded with mephitic or other noxious vapours, it will very frequently die in a moment; while the mere circumstance of debility causes others to bear the same situation with impunity. In these circumstances a sudden exposure to very pure air might even be fatal to an animal very long confined in such as is noxious, just as fire may be put out by too violent a blast of air. Hence we may understand why consumptive persons are not recovered, but often made manifestly worse, by being brought into purer air; and in all probability the death of Travis was hastened by his sudden removal into the open atmosphere. His remaining alive, therefore, for such a length of time in circumstances so very unfavourable, we are to attribute in a particular manner to the extreme debility of the vital powers, by which an exceedingly small quantity of dephlogisticated air was required to support them. We are besides to take into consideration, that in certain cases the air will impart nourishment, even to the bodies of animals as well as vegetables. Under the article *ABSTINENCE*, instances are brought of animal bodies being augmented in bulk without any nourishment taken in by the mouth. In such cases we must conclude, that the nourishment came from the phlogistic particles dispersed through it. It is not impossible, therefore, that in some cases the human body, by absorbing from the atmosphere the phlogiston which it had just emitted by respiration, may purify the air which it had just before contaminated: and thus life might be prolonged in the case of Travis, who was not only destitute of air proper for respiration, but of food and drink also. In cases of famine, it is manifest that there is a great absorption from the atmosphere. Thus a negro who was gibbeted at Charlestown, and had nothing given him afterwards, voided a large quantity of urine every morning; and in cases of lenter and diabetes, the quantity of evacuations greatly exceeds the nourishment taken in by the mouth. On this principle, perhaps, we may account for that very strange phenomenon of animals being found alive in the heart of solid bodies, where there could be no possibility of any connection with the external atmosphere. Instances of these are given under the article *ANIMALCULE*, n° 57.

We shall conclude this part of our subject with some observations made by Mr Henry on the effects of fixed air on vegetation. Experiments on this subject had been made first by Dr Priestley, and afterwards by Dr Percival, but with very different results; the former concluding that fixed air was prejudicial to the growth of vegetables, and Dr Percival that it was favourable to it. Mr Henry endeavours to reconcile the difference. He supposes Dr Percival's meaning to be, not that fixed air, in its pure state and stagnant, was favourable to vegetables immersed in it; but that gradually applied, and in a continued stream, while the plants at the same time are not confined from the common air, do receive from fixed air such a proportion of nourishment as is sufficient for their temporary support, even when removed from every other means of being supplied with food.

Dr Priestley, in his third volume on Air, acknow-

ledges the fairness and candour with which the experiments of Dr Percival were related, but supposes there must have been some mistake; particularly, as the air was produced by Dr Nooth's apparatus, he thinks the quantity could not be so great as was imagined. In support of this opinion he mentioned a great number of experiments, in which fixed air was tried in all proportions, from a state of purity to a mixture of one-third of fixed air with seven-eighths of common air; and in all these the fixed air was found to be injurious, and to destroy the colour of rose-leaves.

From some experiments made by Mr Henry himself, the contrary opinion seemed to be established. By these it appeared that a strawberry plant had not only been preserved alive, exposed in the middle of Dr Nooth's machine to copious streams of fixed air, from the 23d of April to the 14th of May, but that the blossoms, which were only budded when put into the machine, had actually expanded; a strong proof that the plant had continued to vegetate. It was still alive, but in a situation somewhat drooping; and happening to be crushed on taking it out of the apparatus, it was thrown away altogether. Two sprigs of mint, with some earth loosely adhering to their roots, were subjected to a similar experiment from the 1st to the 12th of September; the one having a continual current of fixed air applied to it, but the other being left to the operation of common atmospherical air. The roots of both were cut off on the 7th: that in common air exhibited symptoms of decay on the 12th; but the other continued fresh for more than a week after the other had been decayed almost to the top.

On the 11th of April 1777, the weather being very cold and backward, Mr Henry filled the middle part of Dr Nooth's machine entirely with fixed air, by first filling it with water, inverting it in the same fluid, stopping up the capillary tubes, and then driving out the water from the vessel by a stream of fixed air from an effervescing mixture. The middle was then immediately placed in the lower part of the machine, containing an effervescing mixture also, which had been working for several minutes; and a crimson polyanthus was introduced into the middle part, and suspended by a string. In passing through the mouth of the vessel, the petals were compressed, and one or two received some damage. A young sprig of mint, with its root, was introduced the same day, and into the same vessel; while a similar sprig, as a standard, was placed in a large glass decanter. The polyanthus began to droop on the 15th, and was taken out next day shrivelled but not discoloured. The mint, when examined on the 12th, was apparently more fresh than when first put into the vessel with fixed air; the next day two young shoots appeared still more vigorous. On the 15th its appearance was more vivid than that in common air; but next day it was taken out quite dead. This sudden change, however, our author supposes to have been owing to the machine having no valve; and having been violently shaken, he suspected that some of the vitriolic acid had been forced up through the tubes; for the moisture on the inside of the middle part was found to be more acid than it should have been by fixed air alone.

The experiment was repeated on the 26th of April with a polyanthus plant with its root and flowers, which,

Fixed Air.

Fixed Air. which, with several others, were put into the middle part of Nooth's machine. Here it continued till the 10th of May. The effervescence was frequently renewed; for the first four days twice, and then once a-day; but the discharge of air was continually going on. It continued ten days without any signs of decay; and when taken out of the machine on the 14th day, though some of the older flowers were fading, the others were as fresh and blooming as when put into the vessel; more so than those which had been purchased on the same day, and planted in the garden. The body of the plant was green, succulent, and undecayed. The air extinguished flame. On trial it was found to be one-third fixed air; and during several days, the proportion of fixed air must have been larger.

But, when *confined* in vessels of fixed air, or even in Nooth's machine, with the upper part and grooved stopper put on, plants died sooner than in common air. The air measured was seven-eighths fixed air.

12
Phlogiston
the food of
plants.

"I am informed (says Mr Henry), that an ingenious philosopher of Geneva has made some experiments, by which he has proved, not only that phlogiston is the food of plants, but also, to the satisfaction of Dr Priestley, that it is in the form of fixed air, in proper proportion and place, that this pabulum is administered. In regard to the animal body, it would surely be wrong to say that nothing was nutritious or salutary to it which it could not bear to receive unmixed or undiluted. Why then may we not suppose, that though fixed air, when pure, may be fatal to plants confined in it, and excluded from communication with the external air; yet, when applied in a proper dose, and to plants enjoying a free intercourse with the atmosphere, it may have a contrary effect, and serve to nourish and support them? But in Dr Priestley's experiments, this free intercourse does not appear to have been allowed; and herein, I apprehend, consisted the cause of the difference in our results.

"At that time the constitution of fixed air was not understood. It is now generally allowed to be formed by a combination of phlogiston with the pure part of atmospheric air. The first of these ingredients has been proved by Dr Priestley and others to be favourable to vegetation; while plants droop and decay when exposed to the action of the latter. It should further appear from Dr Ingenhoufz's experiments, that plants have the power of separating phlogiston from common air, applying it to their nurture (A), and throwing out the pure or dephlogisticated residuum as excrementitious. Now allowing, what is highly probable, that they have a similar power of decomposing fixed air, and of applying and rejecting its constituent parts, our method of conducting the experiments was not injurious to the process; whereas, when confined in close vessels, as by Dr Priestley, the plants would be suffocated in a manner reversed to what would happen to an animal. For as in that case, from a want of communication with the atmosphere, as necessary to carry off the phlogistic air from the lungs (according to the beautiful theory of respiration advanced and so well supported by Dr Priestley), the animal must perish; so, in the other instance, the plant would die if cut off from the air of the atmosphere in such a manner that the pure air-ex-

N^o 127.

creted by its vessels would not be conveyed from it. **Fixed A** For in these circumstances, this fluid, so salutary to animal but destructive to vegetable life, must be accumulated in the body of the plant; and its functions being thus impeded, death is the necessary consequence."

As fixed air is now an article of the materia medica, a method of obtaining it readily and in large quantity becomes an object of considerable consequence. Mr Henry, who has proved that fixed air is the proper base of ferments, and the immediate cause of fermentation†, describes an apparatus for impregnating wort or other fermentable liquors with it. This apparatus is represented Plate CXCIII.

AA, Fig. 1. represents the cask in which the wort is to be impregnated; *dd*, the strings by which the air-vessel is to be let down.

Fig. 2. *DD*, The air-vessel, similar to the bottom part of Dr Nooth's glass machine, to be made of glass or earthen ware. *cc*, A glass-stopper ground in to fit the mouth of the vessel, having a number of capillary tubes running from bottom to top in a diverging direction, so as to spread the air in its passage through the liquor.

Fig. 3. The stopper viewed separately to show the capillary tubes.

The method of using this apparatus is obvious from an inspection of the figure; but at the same time it must be equally evident, that it cannot be applied where any very large quantity is to be impregnated. Where great quantities of fixed air are required, we must also use great quantities of fermenting materials; and it would be inconvenient in the highest degree to immerse these in the liquor to be fermented; not to mention, that where large quantities of this kind of materials are mixed, they ought frequently to be stirred or shaken, lest they should concrete into hard lumps; while at the same time they are often apt to swell, and would thus endanger the spoiling of the liquor altogether. It must also be remarked, that any liquid receives an impregnation of fixed air more readily from the surface than by blowing it through the mass of liquid. The apparatus represented fig. 4. therefore seems preferable to that of Mr Henry, as capable of being extended indefinitely almost without any additional trouble. *ABCD* represents a large wooden cask filled with materials to the height represented by *kk*. *E* is a large flat cooler for holding the liquor to be impregnated. This vessel is to be closely covered, and may be conveniently made of lead, having a wooden top, the edges of which are closely luted all round with a mixture of salad oil and finely powdered chalk. *f*, Represents a tin pipe, about an inch in diameter, by which a communication is made between the cask and cooler for the transmission of the fixed air. *gb*, Is a wooden axis passing quite through the cask from top to bottom, and moveable on a centre *b*, having a strong handle at top, to turn it in order to stir the mixture. *iiii*, Are four cross blades fixed into the axis, which, in consequence of turning the handle, stir and raise a great commotion in the liquor contained in the cask. *m*, Is a large hole stopped with a wooden plug, by which the materials may be put in or taken out; and for this last purpose a kind of ladle with an upright stem

(A) See this further discussed under the article AEROLOGY, n^o 51, 52.

Fixed Stars Item as *M* may be made use of. *I*, is a plug stopping up a hole in the lid of the cooler *E*, by which the liquor to be impregnated may be put in, and let out again by the cock *n*.

In this apparatus it is evident, that when an effervescing mixture is put into the cask, the fixed air must pass through the tube *f* into the cooler, where it will be absorbed by the liquor as fast as it is emitted by the materials; but in order to prevent it from escaping, all the junctures must be luted carefully with the mixture of salad oil and chalk already mentioned, which is both sufficiently adhesive, and remaining soft for a long time, may be instantaneously repaired where it happens to be broken. When the effervescence begins to turn languid, it may instantly be quickened by turning the handle; but this will disturb the luting at *oo*, which must therefore be clapped close all round the axis as soon as the matter is sufficiently stirred.

FIXED Stars, are such as constantly retain the same position and distance with respect to each other*; by which they are contradistinguished from *erratic* or *wandering* stars, which are continually shifting their situation and distance.—The fixed stars are what we properly and absolutely call *stars*: the rest have their peculiar denominations of *planet* and *comet*. See ASTRONOMY, per *Index*.

FIXITY, or **FIXEDNESS**, in chemistry, is in a peculiar manner used for the affection opposite to volatility; *i. e.* the property whereby bodies bear the action of the fire, without being dissipated in fumes.

FLACCUS (Caius Valerius), an ancient Latin poet, of whom we have very imperfect accounts remaining. He wrote a poem on the Argonautic expedition; of which, however, he did not live to finish the eighth book, dying at about 30 years of age. John Baptista Pius, an Italian poet, completed the eighth book of the Argonautics; and added two more, from the fourth of Apollonius; which supplement was first added to Aldus's edition in 1523.

FLAGS, in the army, are small banners of distinction stuck in the baggage-waggon, to distinguish the baggage of one brigade from another, and of one battalion from another; that they may be marshalled by the waggon-master general according to the rank of their brigades, to avoid the confusion that might otherwise arise.

FLAG, in the marine, a certain banner or standard, by which an admiral is distinguished at sea from the inferior ships of his squadron; also the colours by which one nation is distinguished from another. See Plate CXCIV.

In the British navy, flags are either red, white, or blue; and are displayed from the top of the main-mast, fore-mast, or mizen-mast, according to the rank of the admiral. When a flag is displayed from the flag-staff on the main-mast, the officer distinguished thereby is known to be an admiral; when from the fore-mast, a vice admiral; and when from the mizen-mast, a rear-admiral.

The first flag in Great Britain is the royal standard, which is only to be hoisted when the king or queen are on board the vessel: the second is that of the anchor of hope, which characterises the lord high admiral, or lords commissioners of the admiralty: and the third is the union-flag, in which the crosses of St George and

St Andrew are blended. This last is appropriated to the admiral of the fleet, who is the first military officer under the lord high admiral.

The next flag after the union is that of the white squadron, at the main-mast head; and the last, which characterises an admiral, is the blue, at the same mast-head.

For a vice-admiral, the first flag is the red, the second the white, the third the blue, at the flag-staff on the fore-mast.

The same order proceeds with regard to the rear-admirals, whose flags are hoisted on the top of the mizen-mast: the lowest flag in our navy is accordingly the blue on the mizen-mast.

To Lower or Strike the FLAG, in the marine, is to pull it down upon the cap, or to take it in, out of the respect, or submission, due from all ships or fleets inferior to those any way justly their superiors. To lower or strike the flag in an engagement is a sign of yielding.

The way of leading a ship in triumph is to tie the flags to the shrouds, or the gallery, in the hind-part of the ship, and let them hang down towards the water, and to tow the vessels by the stern. Livy relates, that this was the way the Romans used those of Carthage.

To Heave out the FLAG, is to put out or put abroad the flag.

To Hang out the White FLAG, is to ask quarter; or it shows, when a vessel is arrived on a coast, that it has no hostile intention, but comes to trade, or the like. The red flag is a sign of defiance, and battle.

FLAG is also used for sedge, a kind of rush.

Corn-FLAG. See GLADIOLUS.

Sweet-scented FLAG. See ACORUS.

FLAG-Officers, those who command the several squadrons of a fleet; such are the admirals, vice-admirals, and rear-admirals.

The flag-officers in our pay, are the admiral, vice-admiral, and rear admiral, of the white, red, and blue. See ADMIRAL, FLAG, and FLEET.

FLAG-Ship, a ship commanded by a general or flag-officer, who has a right to carry a flag, in contradistinction to the secondary vessels under the command thereof.

FLAG-Stone, a genus of argillaceous earths, of a grey, yellowish, or reddish-white colour; not giving fire with steel, nor effervescing with acids. Its specific gravity is from 2600 to 2780. Sometimes it is found compact, and sometimes like the argillaceous grit; in which case its gravity is less. Its general use is for flooring houses, though sometimes it is made use of for covering them. There is also a calcareous flag-stone found near Woodstock in England. It is of a yellowish-white colour, and moderately hard, containing a little iron. Its specific gravity is 2585.

FLAGELLANTES, a sect of wild fanatics who chastised and disciplined themselves with whips in public.

The sect of the Flagellantes had its rise in Italy in the year 1260; its author was one Rainier a hermit; and it was propagated from hence through almost all the countries of Europe. It was in all probability no more than the effect of an indiscreet zeal. A great number of persons of all ages and sexes made professions,

Flagellantes
Flake.

sions, walking two by two with their shoulders bare, which they whipped till the blood ran down, in order to obtain mercy from God, and appease his indignation against the wickedness of the age. They were then called the *devout*; and having established a superior, he was called the *general of the devotion*. Though the primitive Flagellantes were exemplary in point of morals, yet they were joined by a turbulent rabble, who were infected with the most ridiculous and impious opinions; so that the emperors and pontiffs thought proper to put an end to this religious phrensy, by declaring all devout whipping contrary to the divine law, and prejudicial to the soul's eternal interest.

However, this sect revived in Germany towards the middle of the next century, and rambling through many provinces, occasioned great disturbances. They held, among other things, that flagellation was of equal virtue with baptism and the other sacraments; that the forgiveness of all sins was to be obtained by it from God without the merits of Jesus Christ; that the old law of Christ was soon to be abolished, and that a new law enjoining the baptism of blood to be administered by whipping was to be substituted in its place: upon which Clement VII. by an injudicious as well as unrighteous policy, thundered out anathemas against the Flagellantes, who were burnt by the inquisitors in several places; but they were not easily extirpated. They appeared again in Thuringia and Lower Saxony in the 15th century; and rejected not only the sacraments, but every branch of external worship; and placed their only hopes of salvation in faith and flagellation, to which they added other strange doctrines concerning evil spirits. Their leader Conrad Schmidt and many others were committed to the flames by German inquisitors in and after the year 1414.

FLAGEOLET, or FLAJEOLET, a little flute, used chiefly by shepherds and country-people. It is made of box or other hard wood, and sometimes of ivory; and has six holes besides that at the bottom, the mouth-piece, and that behind the neck.

FLAIL, an instrument for threshing corn. It consists of the following parts. 1. The hand-staff, or piece held in the thresher's hand. 2. The swiple, or that part which strikes out the corn. 3. The caplins, or strong double leathers, made fast to the tops of the hand-staff and swiple. 4. The middle-band, being the leather thong or fish skin that ties the caplins together.

FLAIR, in sea-language. The seamen say that the work doth flair over, when a ship being housed in near the water, so that the work hangs over a little too much, and thus is let out broader aloft than the due proportion will allow.

FLAKE, in the cod-fishery, a sort of scaffold or platform, made of hurdles, and supported by stanchions, and used for drying cod-fish in Newfoundland. These flakes are usually placed near the shores of fishing-harbours.

FLAKE, in gardening, a name given by the florists to a sort of carnations which are of two colours only, and have very large stripes, all of them going quite through the leaves.

White FLAKE, in painting, is lead corroded by means of the pressing of grapes, or a cerufs prepared by the acid of grapes. It is brought here from Italy; and far surpasses, both with regard to the purity of its

whiteness and the certainty of its standing, all the cerufs or white lead made with us in common. It is used in oil and varnish painting for all purposes where a very clean white is required. The white flake should be procured in lumps as it is brought over, and levigated by those who use it; because that which the colourmen sell in a prepared state is levigated and mixed up with starch, and often with white lead, and worse sophistication.

FLAMBEAU, or FLAMBOY, a luminary made of several thick wicks, covered over with wax, serving to burn at nights in the streets; as also at funeral processions, illuminations, &c.

Flambeaux differ from links, torches, and tapers. They are made square, sometimes of white wax and sometimes of yellow. They usually consist of four wicks or branches near an inch thick, and about three feet long, made of a sort of coarse hempen yarn half twisted. They are made with the ladle much as torches or tapers are; viz. by first pouring the melted wax on the top of the several suspended wicks, and letting it run down to the bottom. This they repeat twice. After each wick has thus got its proper cover of wax, they lay them to dry; then roll them on a table, and so join four of them together by means of a red-hot iron. When joined, they pour on more wax till the flambeau is brought to the size required, which is usually from a pound and half to three pounds. The last thing is to finish their form or outside, which they do with a kind of polishing instrument of wood by running it along all the angles formed by the union of the branches.

The flambeaux of the ancients were different from ours. They were made of woods dried in furnaces or otherwise. They used divers kinds of wood for this purpose; the wood most usual was pine. Pliny says, that in his time they frequently also burnt oak, elm, and hazle. In the seventh book of the *Æneid*, mention is made of a flambeau of pine; and Servius on that passage remarks, that they also made them of the cornel-tree.

FLAMBOROUGH-HEAD, in geography, a cape or promontory on the eastern coast of Yorkshire, five miles east of Burlington, and 216 from London. E. Long. 20°. N. Lat. 54, 15.—This was the *Fleamburg* of the Saxons; so called, as some think, from the lights made on it to direct the landing of Ida, who in 547 joined his countrymen in these parts with a large reinforcement from Germany, and founded the kingdom of Northumberland. In the time of Edward the Confessor, Flamborough was one of the manors of Harold, Earl of the West-Saxons, afterwards king of England. On his death, the Conqueror gave it to Hugh Lupus; who, in perpetual alms, bestowed it on the monastery of Whitby.—The town is on the north side; and consists of about 150 small houses, entirely inhabited by fishermen; few of whom, as is said, die in their beds, but meet their fate in the element they are so conversant in. The cliffs of the Head are of a tremendous height and amazing grandeur. Beneath are several vast caverns; some closed at the end, others pervious, formed with a natural arch. In some places the rocks are insulated, and of a pyramidal figure, soaring up to a vast height. The bases of most are solid, but in some pierced through and arched. The colour

Flambeau
Flambo-
rough-
Head.

Flame. colour of all these rocks is white, from the dung of the innumerable flocks of migratory birds, which quite cover the face of them, filling every little projection, every hole that will give them leave to rest.

FLAME, is a general name for every kind of luminous vapour; provided the light it emits hath any considerable degree of intensity. The name *flame*, however, is most generally applied to such as are of a conical figure, like those arising from our common fires; without this, they are commonly called *luminous vapours*, or simply *lights*.

According to Sir Isaac Newton, flame is only *red-hot smoke*, or the vapour of any substance raised from it by fire, and heated to such a degree as to emit light copiously. This definition seems to be the most accurate and expressive of any. It is certain, that bodies are capable of emitting flame only in proportion to the quantity of vapour that rises from them. Thus wood, coals, &c. which emit a great quantity of vapour, flame violently; while lead, tin, &c. which emit but a small fume, can scarce be perceived to flame at all.

This rule, however, is by no means to be depended upon in all cases. Some vapours *seem* to be in their own nature unflammable, and capable of extinguishing flame; as those of water, the mineral acids, sal-ammoniac, arsenic, &c.: while others take fire on the slightest approach of a flaming substance; such as ether, spirit of wine, &c. These last mentioned substances also exhibit a remarkable phenomenon; namely, that they cannot be made to flame without the approach of some substance actually in flames beforehand. Thus, spirit of wine poured on a red-hot iron, though instantly dissipated in vapour, will not flame; but if a burning candle touches its surface, the whole is set in a flame at once. The case is otherwise with oils, especially those of the grosser kind; for their vapours will readily be changed into flame by the mere increase of heat, without the approach of any flaming substance.

There is, however, no kind of vapour, perhaps, that is incapable of being converted into flame, provided it is exposed to a sufficient degree of heat. Thus the vapour of water made to pass through burning coals produces an exceedingly strong and bright flame.—It is remarkable, that this kind of vapour seems to be more powerful than almost any other in absorbing heat, and detaining it in a latent state. Dr Black hath shown, that when any quantity of aqueous vapour is condensed, more heat will be separated from it than would have been sufficient to heat an equal bulk of iron red-hot.—It is most probably to this property which all vapours have of absorbing heat, and detaining it in a latent state, that we are to attribute the phenomena of flame, and also the exceeding great elasticity of steam. It is certain, that vapours, of water at least, have a much greater power of absorbing and retaining heat, than the water from which they are raised. In open vessels, water cannot be heated more than 212 degrees of Fahrenheit's thermometer; but in Papin's digester, where the vapour is forcibly confined, it has been heated to 400 of the same degrees; and, no doubt, might have been heated a great deal more, had the vessels been strong enough to bear the expansive force of the steam. On opening the vessels, however, the excess of heat was found to have resided entirely in the vapour;

for the water in the vessel very soon sunk down to 212°, while the steam issued forth with great violence.

From these experiments it appears, that the steam of water, after it has absorbed as much heat in a latent state as it can contain, continues to absorb, or detain among its particles, an unlimited quantity of sensible heat; and if the steam could be confined till this quantity became great enough to be visible by its emission of light, there cannot be the least doubt that the vapour would then be converted into flame.

In what manner the heat is detained among the particles of steam, is perhaps impossible to be explained; but to this heat we must undoubtedly ascribe the violent expansive force of steam of every kind. It seems probable, that when smoke is converted into flame, the latent heat with which the vapour had combined, or rather that which made an essential part of it, breaks forth, and adds to the quantity of sensible heat which is already present. This seems probable, from the sudden explosion with which all flames break out. If a vessel full of oil is set over the fire, a smoke or vapour begins to arise from it; which grows gradually thicker and thicker; and at last begins to shine in some places very near the surface of the oil, like an electric light, or sulphur just kindled. At this time the oil is very hot, as well as the steam which issues from it. But this last is continually giving off its sensible heat into the atmosphere; so that at the distance of an inch or two from the surface of the oil, the heat of the steam will not exceed 400 degrees of Fahrenheit, or perhaps may not be so much; but if a burning candle is held in the steam for a moment, the whole is immediately converted into flame, with something like an explosion; after which, the oil burns quietly until it is all consumed. The flame, as soon as it appears, is not only much hotter than the steam from whence it was produced, but even than the oil which lies below it. Whence, then, has this sudden and great increase of heat arisen? It could not be the *sensible* heat of the vapour, for that was greatly inferior; nor could it be communicated from the oil, for that could communicate no more than it had to itself. The candle, indeed, would communicate a quantity of heat to the vapour which touched its flame; but it is impossible that this quantity should extend permanently over a surface perhaps 100 times larger than the flame of the candle, in such a manner as to make every part of that surface equally hot with the flame of the candle itself; for this would be to suppose it to communicate 100 times more heat than really was in it. The heat therefore must have originally resided in the vapour itself: and as, in the freezing of water, its latent heat is extricated and becomes sensible, and the water thereupon loses its fluidity; so, in the accension of vapour, the latent heat breaks forth with a bright flash, and the vapour is then totally decomposed, and converted into soot, ashes, or water, according to the different nature of the substances which produce it, or according to the intensity of the heat.—Several other hypotheses have been invented to solve the phenomena of burning and flaming bodies; for an account of which, see the articles IGNITION, PHLOGISTON, &c.

Flames are of different colours, according to the substances from which they are produced. Thus, the

Flamen
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Flamininus

flame of sulphur and spirit of wine is blue; the flame of nitre and zinc, of a bright white; that of copper, of a greenish blue, &c.—These varieties afford an opportunity of making a number of agreeable representations in fire-works, which could not be done if the flame produced from every different substance was of the same colour. See PYROTECHNICS.

FLAMEN, in Roman antiquity, the name of an order of priests, instituted by Romulus or Numa; authors not being agreed on this head.

They were originally only three, viz. the *Flamen Dialis*, *Flamen Martialis*, and *Flamen Quirinalis*. The *Flamen Dialis* was sacred to Jupiter, and a person of the highest consequence and authority in the state. He discharged several religious duties which properly belonged to the kings, and was honoured with many eminent privileges beyond all other officers, but was obliged to observe several superstitious restraints. The *Flamen Martialis* was sacred to Mars, and was ordained to inspect the rites of that god. The *Flamen Quirinalis* was sacred to, and superintended the rites of, *Quirinus Romulus*. The *Flamines* last mentioned, though of high authority, were much inferior to the *Flamen Dialis*. All three were chosen by the people, and consecrated by the *Pontifex Maximus*.—In latter times several priests of the same order and name were added to them, but inferior in power. The whole number at last amounted to 15: the three first of whom were senators, and called *Flamines majores*; the other 12, taken from among the people, being denominated *Flamines minores*.—Some authors tell us the Romans had a *Flamen* for every deity they worshipped. The greater *Flamines* wore the robe edged with purple, like the great magistrates; had an ivory chair, and a seat in the senate. They wore a little band of thread about their heads, whence their name is said to be derived, *Quasi Filamines*.—Wife of the *Flamen Dialis* was called *Flaminica*, and wore a flame coloured habit, on which was painted a thunder-bolt, and above her head-dress she had green oak boughs, to indicate that she belonged to Jupiter the thunderer, to whom the oak was sacred. The *Flamines* wore each of them a hat or cap called *Flammeum* or *Apex*.

FLAMINGO, in ornithology. See PHOENICOP-TERUS.

FLAMINIUS, or FLAMININUS, (T. Q.) a celebrated Roman raised to the consulship in the year of Rome 554, though under the age of 30. He was trained in the art of war against Hannibal; and he showed himself capable in every respect to discharge with honour the great office with which he was entrusted. He was sent at the head of the Roman troops against Philip king of Macedonia, and in his expedition he met with uncommon success. The Greeks gradually declared themselves his firmest supporters; and he totally defeated Philip on the confines of Epirus, and made all Locris, Phocis, and Thessaly, tributary to the Roman power. He granted peace to the conquered monarch, and proclaimed all Greece free and independent at the Isthmian games. This celebrated action procured the name of Patrons of Greece to the Romans, and insensibly paved their way to universal dominion. Flamininus behaved among them with the greatest policy; by his ready compliance to their national customs and prejudices, he gained uncommon popularity, and received the name of

father and deliverer of Greece. He was afterwards sent ambassador to king Prusias, who had given refuge to Hannibal; and there his prudence and artifice hastened out of the world a man who had long been the terror of the Romans. Flamininus was found dead in his bed, after a life spent in the greatest glory, in which he had imitated with success the virtues of his model Scipio.

FLAMINIUS, or FLAMINIO, (Mark Anthony), one of the best Latin poets in the 16th century, of Imola in Italy, son and grandson of very learned men. The pope had chosen him secretary to the council in 1545; but he refused that employment, because, favouring the new opinions, he would not employ his pen in an assembly where he knew these opinions were to be condemned.—He paraphrased 30 of the psalms in Latin verse, and also wrote notes on the psalms; and some letters and poems which are esteemed. He died at Rome in 1550.

FLAMSTED, a town of Hertfordshire in England, 5 miles from St Alban's and Duntstable, stands on the river Verlam, and was of old called Verlamstede. The land hereabouts is a clay so thickly mixed with flints, that, after a shower, nothing appears but a heap of stones; and yet it bears very good corn even in dry summers. This fertility is imputed to a warmth in the flint, which preserves it from cold in the winter; and to its closeness, which keeps it from the scorching rays of the sun in the summer. Edward VI. when an infant, was brought hither for his health; and, it is said, the bedstead he lay on, which is curiously wrought, is still preserved in the manor-house just by.

FLAMSTEED (John), an eminent English astronomer in the 13th century, born at Derby in 1646. He had early read a great deal of civil and ecclesiastical history; but happening to see John de Sacrobosco's book *de Sphæra*, this gave him a turn for astronomy, which study he afterwards prosecuted with great vigour. His father, finding him in correspondence with several learned men, advised him to go to London, that he might be personally acquainted with them. In 1674, he wrote an ephemeris, in which he showed the falsity of astrology; and gave a table of the moon's rising and setting, carefully calculated, together with the eclipses and appulses of the moon and planets to fixed stars. This fell into the hands of Sir Jonas More; for whom, at his request, he made a table of the moon's true southings. In 1674, Sir Jonas having informed him, that a true account of the tides would be highly acceptable to his majesty, he composed a small ephemeris for the king's use: and when Sir Jonas showed the king and duke of York our author's telescopes and micrometer, and recommended him strongly, he procured him a warrant to be king's astronomer, with the salary of L. 100 *per annum*; on which occasion he was ordained. In 1675, the foundation of the royal observatory at Greenwich was laid, and during the building he lodged at Greenwich; his quadrant and telescopes being kept in the queen's house there. His *Doctrine of the Sphere* was published in 1681, in a posthumous work of Sir Jonas More, intitled, *A new System of the Mathematics*. In 1684, he was presented to the living of Burfrow in Surry, which he enjoyed till he died in 1719. His *Historia celestis Britannica* was published at London in 1725, in 3 vols. Mr Flamsteed likewise composed the British Catalogue of the

Flaminus
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Flamsteed.

Flanel. the fixed stars, which contains twice the number that are in the catalogue of Hevelius; to each of which he annexed its longitude, latitude, right ascension, and distance from the pole, together with the variation of right ascension and declination, while the longitude increases a degree. This catalogue, together with most of his observations, were printed on a fine paper and character, at the expence of the late prince George of Denmark.

FLANDERS, a province of the Netherlands, bounded by the German sea and the United Provinces on the north, by the province of Brabant on the east, by Hainault and Artois on the south, and by another part of Artois and the German sea on the west; being about 60 miles long, and 50 broad, and divided between the Austrians, the French, and the Dutch.

Flanders is a perfectly champaign country, with not a rising ground or hill in it, and watered with many fine rivers and canals. Its chief commodities are fine lace, linen, and tapestry.

In this country some important arts were invented and improved. Weaving in general was greatly improved, and that of figures of all sorts in linen were invented; also the art of dyeing cloths and stuffs, and of oil-colours; the curing of herrings, &c. The manufactures of this country are not now in the flourishing state they were formerly; yet silk, cotton, and woollen stuffs, brocades, camblets, tapestry, lace, and linen, are still manufactured here in great quantities. This province had counts of its own from the ninth century to the year 1369, when it went by marriage to the dukes of Burgundy; and afterwards from them, by marriage also, to the house of Austria. France, in 1667, seized the southern part; and the States-General obtained the northern, partly by the treaty of Munster, and partly by the barrier-treaty of 1715.

For a more particular history of Flanders, with a continuation down to the present times, see the article NETHERLANDS.

FLANEL, or FLANNEL, a kind of slight, loose, woollen stuff, composed of a woof and warp, and wove on a loom with two treddles, after the manner of bays.

Dr Black assigns as a reason why flanel and other substances of the kind keep our bodies warm, that they compose a rare and spongy mass, the fibres of which touch each other so slightly, that the heat moves slowly thro' the interstices, which being filled only with air, and that in a stagnant state, give little assistance in conducting the heat. Sir Benjamin Thomson has inquired farther into the matter, and finds that there is a relation betwixt the power which the substances usually worn as clothing have of absorbing moisture, and that of keeping our bodies warm. Having provided a quantity of each of these substances mentioned below, he exposed them, spread out upon clean China plates, for the space of 24 hours to the warm and dry air of a room which had been heated by a German stove for several months, and during the last six hours had raised the thermometer to 85° of Fahrenheit; after which he weighed equal quantities of the different substances with a very accurate balance. They were then spread out upon a China plate, and removed into a very large uninhabited room upon the second floor, where they were exposed 48 hours upon a table placed in the middle of

the room, the air of which was at 45° of Fahrenheit. At the end of this space they were weighed, and then removed into a damp cellar, and placed on a table in the middle of the vault, where the air was at the temperature of 45°, and which by the hygrometer seemed to be fully saturated with moisture. In this situation they were suffered to remain three days and three nights; the vault being all the time hung round with wet linen cloths, to render the air as completely damp as possible. At the end of three days they were weighed, and the weights at the different times were found as in the following table.

	Weight after being dried in the hot room.	Weight after coming out of the cold room.	Weight after remaining 72 h. in the vault.
Sheeps wool		1084	1163
Beaver's fur		1072	1125
The fur of a Russian hare		1065	1115
Eeder down		1067	1112
Silk { Raw single thread	Parts 1000	1057	1107
{ Ravellings of white taffety		1054	1103
{ Fine lint		1046	1102
{ Ravellings of fine linen		1044	1082
Cotton wool		1043	1089
Ravellings of silver lace		1000	1000

On these experiments our author observes, that though linen, from the apparent ease with which it receives dampness from the atmosphere, seems to have a much greater attraction for water than any other; yet it would appear from what is related above, that those bodies which receive water in its unelastic form with the greatest ease, or are most easily wet, are not those which in all cases attract the moisture of the atmosphere with the greatest avidity. "Perhaps (says he), the apparent dampness of linen to the touch, arises more from the ease with which that substance parts with the water it contains, than from the quantity of water it actually holds: in the same manner as a body appears hot to the touch, in consequence of its parting freely with its heat; while another body, which is really at the same temperature, but which with-holds its heat with greater obstinacy, affects the sense of feeling much less violently. It is well known that woollen clothes, such as flannels, &c. worn next the skin, greatly promote insensible perspiration. May not this arise principally from the strong attraction which subsists between wool and the watery vapour which is continually issuing from the human body? That it does not depend entirely on the warmth of that covering, is clear; for the same degree of warmth produced by wearing more clothing of a different kind, does not produce the same effect. The perspiration of the human body being absorbed by a covering of flanel, it is immediately distributed through the whole thickness of that substance, and by that means exposed, by a very large surface, to be carried off by the atmosphere; and the loss of this watery vapour, which the flanel sustains on the one side by evaporation, being immediately restored from the other, in consequence of the strong attraction between the flanel and this vapour, the pores of the skin are disincumbered, and they are continually surrounded by a dry and salubrious atmosphere."

Our author expresses his surprise, that the custom of wearing

Flanel.

Flank
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Flatman.

wearing flanel next the skin should not have prevailed more universally. He is confident it would prevent a number of diseases; and he thinks there is no greater luxury than the comfortable sensation which arises from wearing it, especially after one is a little accustomed to it. "It is a mistaken notion (says he), that it is too warm a clothing for summer. I have worn it in the hottest climates, and at all seasons of the year; and never found the least inconvenience from it. It is the warm bath of a perspiration confined by a linen shirt, wet with sweat, which renders the summer heats of southern climates so insupportable; but flanel promotes perspiration, and favours its evaporation; and evaporation, as is well known, produces positive cold.

It has been observed that new flanel, after some time wearing, acquires the property of shining in the dark, but loses it on being washed. *Philos. Transf.* n^o 483. § 7.

FLANK, or FLANC, in the manege, is applied to the sides of a horse's buttocks, &c. In a strict sense, the flanks of a horse are the extremes of the belly, where the ribs are wanting, and are below the loins.

The flanks of a horse should be full, and at the top of each a feather. The distance between the last rib and haunch-bone, which is properly the flank, should be short, which they term *well coupled*, such horses being most hardy, and fit to endure labour.

A horse is said to have no flank if the last of the short ribs be at a considerable distance from the haunch-bone; as also when his ribs are too much straightened in their compass.

FLANK, in war, is used by way of analogy for the side of a battalion, army, &c. in contradistinction to the *front* and *rear*.

To *attack the enemy in flank*, is to discover and fire upon them on one side. See FILE.

FLANK, in fortification, is a line drawn from the extremity of the face towards the inside of the work.

Or, flank is that part of a bastion which reaches from the curtain to the face, and defends the opposite face, the flank, and the curtain. See FORTIFICATION.

FLAT, in sea-language, denotes a level ground lying at a small depth under the surface of the sea, and is also called a *shoal* or *shallow*.

FLAT-bottomed Boats are such as are made to swim in shallow water, and to carry a great number of troops, artillery, ammunition, &c. They are constructed with a 12 pounder, bow-chase, and an 18 pounder, stern-chase; their keel is from 90 to 100 feet, and from 12 to 24 feet beam: they have one mast, a large square main sail, and a jib-sail; are rowed by 18 or 20 oars, and can carry 400 men each. The gun takes up one bow, and a bridge the other, over which the troops are to march. Those that carry horses have the fore-part of the boat made to open when the men are to mount and ride over a bridge.

FLATMAN (Thomas), an English poet of some repute, born at London about the year 1633. He studied at the Inner-Temple, and became a barrister, but it does not appear that he ever practised; for having a turn for the fine arts, he gave a loose to his inclination that way, and acquired reputation, both as a poet and a painter. He published, in 1682, a third edition of his poems and songs, dedicated to the duke of Ormond, with a print of himself as a

frontispiece: he also published a satirical romance in prose, on Richard Cromwell, soon after the restoration; which took greatly at that turn of affairs. He died about 1688.

FLATS, in music. See INTERVAL.

FLATUS, FLATULENCE, in medicine; vapours generated in the stomach and intestines, chiefly occasioned by a weakness of these parts. They occasion distensions, uneasy sensation, and sickness, and often a considerable degree of pain. See (the *Index* subjoined to) MEDICINE.

FLAVEL (John), an eminent nonconformist minister, was educated at University-college, in Oxford; and became minister of Deptford, and afterwards of Dartmouth in Devonshire, where he resided the greatest part of his life, and was admired for his preaching. Though he was generally respected at Dartmouth; yet, in 1685, several of the aldermen of that town, attended by the rabble, carried about a ridiculous effigy of him, to which were affixed the Bill of Exclusion and the Covenant. Upon this occasion, he thought it prudent to withdraw from the town; not knowing what treatment he might meet with from a riotous mob, headed by magistrates who were themselves among the lowest of mankind. Part of his Diary, printed with his Remains, must give the reader a high idea of his piety. He died in 1691, aged 61; and after his death, his works, which consisted of many pieces of practical divinity, were printed in two volumes folio. Among these, the most famous are his "Navigation Spiritualized, or a New Compass for Seamen, consisting of 32 points of pleasant observations and serious reflections," of which there have been several editions in 8vo; and his "Husbandry Spiritualized, &c. with occasional meditations upon beasts, birds, trees, flowers, rivers, and several other objects," of which also there have been many editions in octavo.

FLAX, in botany. See LINUM.

The following particulars with regard to the manner of raising flax, has been for some years past warmly recommended by the trustees for fisheries, manufactures, and improvements in Scotland.

Of the choice of the Soil, and preparing the Ground for FLAX. A skilful flax-raiser always prefers a free open deep loam, and all grounds that produced the preceding year a good crop of turnip, cabbage, potatoes, barley, or broad clover; or have been formerly laid down rich, and kept for some years in pasture.

A clay soil, the second or third crop after being limed, will answer well for flax; provided, if the ground be still stiff, that it be brought to a proper mould, by tilling after harvest, to expose it to the winter frosts.

All new grounds produce a strong crop of flax, and pretty free of weeds. When a great many mole-heaps appear upon new ground, it answers the better for flax after one tilling.

Flax-seed ought never to be sown on grounds that are either too wet or dry; but on such as retain a natural moisture: and such grounds as are inclined to weeds ought to be avoided, unless prepared by a careful summer-fallow.

If the lint-seed be sown early, and the flax not allowed to stand for seed, a crop of turnip may be got after the flax that very year; the second year a crop

Flax
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Flax.

Flax.

of bear or barley may be taken; and the third year, grafs-seeds are sometimes sown along with the lintseed. This is the method mostly practised in and about the counties of Lincoln and Somerset, where great quantities of flax and hemp are every year raised, and where these crops have long been capital articles. There, old ploughed grounds are never sown with lintseed, unless the soil be very rich and clean. A certain worm, called in Scotland the *coup-worm*, abounds in new-broke up grounds, which greatly hurts every crop but flax. In small inclosures surrounded with trees or high hedges, the flax, for want of free air, is subject to fall before it be ripe, and the droppings of rain and dew from the trees prevent the flax within the reach of the trees from growing to any perfection.

Of preceding crops, potatoes and hemp are the best preparation for flax. In the fens of Lincoln, upon proper ground of old tillage, they sow hemp, dunging well the first year; the second year hemp without dung; the third year, flax without dung; and that same year, a crop of turnip eat on the ground by sheep; the fourth year, hemp with a large coat of dung; and so on for ever.

If the ground be free and open, it should be but once ploughed; and that as shallow as possible, not deeper than $2\frac{1}{2}$ inches. It should be laid flat, reduced to a fine garden mould by much harrowing, and all stones and fods should be carried off.

Except a little pigeon's dung for cold or four ground, no other dung should be used preparatory for flax; because it produces too many weeds, and throws up the flax thin and poor upon the stalk.

Before sowing, the bulky clods should be broken, or carried off the ground; and stones, quickenings, and every other thing that may hinder the growth of the flax, should be removed.

Of the choice of Lintseed. The brighter in colour, and heavier the seed is, so much the better; that which when bruised appears of a light or yellowish green, and fresh in the heart, oily and not dry, and smells and tastes sweet, and not fusty, may be depended upon.

Dutch seed of the preceding year's growth, for the most part, answers best; but it seldom succeeds if kept another year. It ripens sooner than any other foreign seed. Philadelphia-seed produces fine lint and few bolls, because sown thick, and answers best in wet cold soils. Riga-seed produces coarser lint, and the greatest quantity of seed. Scots-seed, when well winned and kept, and changed from one kind of soil to another, sometimes answers pretty well; but should be sown thick, as many of its grains are bad, and fail. It springs well, and its flax is sooner ripe than any other; but its produce afterwards is generally inferior to that from foreign seed.

A kind has been lately imported, called *memmel-seed*; which looks well, is short and plump, but seldom grows above eight inches, and on that account ought not to be sown.

Of Sowing Lintseed. The quantity of lintseed sown should be proportioned to the condition of the soil; for if the ground be in good heart, and the seed sown thick, the crop will be in danger of falling before it is ready for pulling. From 11 to 12 pecks Linlithgow measure of Dutch or Riga seed, is generally sufficient

for one Scots acre; and about 10 pecks of Philadelphia seed, which, being the smallest grained, goes farthest. Riga lintseed, and the next year's produce of it, is preferred in Lincolnshire.

The time for sowing lintseed is from the middle of March to the end of April, as the ground and season answers; but the earlier the seed is sown, the less the crop interferes with the corn-harvest.

Late sown lintseed may grow long, but the flax upon the stalk will be thin and poor.

After sowing, the ground ought to be harrowed till the seed is well covered, and then (supposing the soil, as before mentioned, to be free and reduced to a fine mould) it ought to be rolled.

When a farmer sows a large quantity of lintseed, he may find it proper to sow a part earlier and part later, that in the future operations of weeding, pulling, watering, and grassing, the work may be the easier and more conveniently gone about.

It ought always to be sown on a dry bed.

Of Weeding FLAX. It ought to be weeded when the crop is about four inches long. If longer deferred, the weeders will so much break and crook the stalks, that they will never perhaps recover their straightness again; and when the flax grows crooked, it is more liable to be hurt in the rippling and swinging.

Quickening-grass should not be taken up; for, being strongly rooted, the pulling of it always loosens a deal of the lint.

If there is an appearance of a settled drought, it is better to defer the weeding, than by that operation to expose the tender roots of the flax to the drought.

How soon the weeds are got out, they ought to be carried off the field, instead of being laid in the furrows, where they often take root again, and at any rate obstruct the growth of the flax in the furrows.

Of Pulling FLAX. When the crop grows so short and branchy, as to appear more valuable for seed than flax, it ought not to be pulled before it be thoroughly ripe; but if it grows long and not branchy, the seed should be disregarded, and all the attention given to the flax. In the last case it ought to be pulled after the bloom has fallen, when the stalk begins to turn yellow, and before the leaves fall, and the bolls turn hard and sharp pointed.

When the stalk is small, and carries few bolls, the flax is fine; but the stalk of coarse flax is gross, rank, branchy, and carries many bolls.

When the flax has fallen, and lies; such as lies ought to be immediately pulled, whether it has grown enough or not, as otherwise it will rot altogether.

When parts of the same field grow unequally, so that some parts are ready for pulling before other parts; only what is ready should be pulled, and the rest should be suffered to stand till ready.

The flax-raiser ought to be at pains to pull, and keep by itself, each different kind of lint which he finds in his field; what is both long and fine, by itself; what is both long and coarse, by itself; what is both short and fine, by itself; what is both short and coarse, by itself; and in like manner every other kind by itself that is of the same size and quality. If the different kinds be not thus kept separate, the flax must be much damaged in the watering and the other succeeding operations.

Flax.

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Flax.

What is commonly called *under-growth* may be neglected as useless.

Few persons that have seen pulled flax, are ignorant of the method of laying it in handfuls across each other; which gives the flax sufficient air, and keeps the handfuls separate and ready for the rippler.

Of Stacking up FLAX during the Winter, and Winning the Seed. If the flax be more valuable than the seed, it ought by no means to be stacked up; for its own natural juice afflicts it greatly in the watering; whereas, if kept long unwatered, it loses that juice, and the harle adheres so much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harsher and coarser. Besides, the flax stacked up over year, is in great danger from vermin and other accidents; the water in spring is not so soft and warm as in harvest; and near a year is thereby lost of the use of the lint: but if the flax be so short and branchy as to appear most valuable for seed, it ought, after pulling, to be stooked and dried upon the field, as is done with corn; then stacked up for winter, rippled in spring; and after sheeling, the seed should be well cleaned from bad seeds, &c.

Of Rippling FLAX. After pulling, if the flax is to be regarded more than the seed, it should be allowed to lie some hours upon the ground to dry a little, and so gain some firmness, to prevent the skin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwise spoil the water. The bolls also prove very inconvenient in the grassing and breaking.

In Lincolnshire and Ireland, they think that rippling hurts the flax; and therefore, in place of rippling, they strike the bolls against a stone.

The handfuls for rippling should not be great, as that endangers the lint in the rippling comb.

After rippling, the flax-raiser will perceive, that he is able to assort each size and quality of the flax by itself more exactly than he could before.

Of Watering FLAX. A running stream washes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, also waste and whiten the flax, though not so much as running streams. Both rivers and lochs water the flax quicker than canals.

But all flax ought to be watered in canals, which should be digged in clay ground if possible, as that soil retains the water best: but if a firm retentive soil cannot be got, the bottom or sides of the canal, or both the bottom and sides, may be lined with clay; or instead of lining the sides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

A canal of 40 feet long, six broad, and four deep, will generally water the growth of an acre of flax.

It ought to be filled with fresh soft water from a river or brook, if possible two or three weeks before the flax is put in, and exposed all that time to the heat of the sun. The greater way the river or brook has run, the softer, and therefore the better, will the water be. Springs, or short-runs from hills, are too cold,

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unless the water is allowed to stand long in the canal. Water from coal or iron is very bad for flax. A little of the powder of galls thrown into a glass of water, will immediately discover if it comes from minerals of that kind, by turning it into a dark colour, more or less tinged in proportion to the quantity of vitriol it contains.

The canal ought not to be under shade; which, besides keeping the sun from softening the water, might make part of the canal cooler than other parts, and so water the flax unequally.

The flax-raiser will observe, when the water is brought to a proper heat, that small plants will be rising quickly in it, numbers of small insects and reptiles will be generating there, and bubbles of air rising on the surface. If no such signs appear, the water must not be warm enough, or is otherwise unfit for flax.

Moss-holes, when neither too deep nor too shallow, frequently answer well for watering flax, when the water is proper, as before described.

The proper season for watering flax is from the end of July to the end of August.

The advantage of watering flax as soon as possible after pulling, has been already mentioned.

The flax being sorted after rippling, as before-mentioned, should next be put in beets, never larger than a man can grasp with both his hands, and tied very slack with a band of a few stalks. Dried rushes answer exceedingly well for binding flax, as they do not rot in the water, and may be dried and kept for use again.

The beets should be put into the canals slope-ways, or half standing upon end, the root-end uppermost. Upon the crop-ends, when uppermost, there frequently breeds a deal of vermin, destructive of the flax, which is effectually prevented by putting the crop-end downmost.

The whole flax in the canal ought to be carefully covered from the sun with divots; the grassy side of which should be next the flax, to keep it clean. If it is not thus covered, the sun will discolour the flax, though quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few stones may be laid above them. But the flax should not be pressed to the bottom.

When the flax is sufficiently watered, it feels soft to the gripe, and the harle parts easily with the boon or show, which last is then become brittle, and looks whitish. When these signs are found, the flax should be taken out of the water, beet after beet; each gently rinsed in the water, to cleanse it of the nastiness which has gathered about it in the canal; and as the lint is then very tender, and the beet slackly tied, it must be carefully and gently handled.

Great care ought to be taken that no part be overdone; and as the coarsest waters soonest, if different kinds be mixed together, a part will be rotted, when the rest is not sufficiently watered.

When lint taken out of the canal is not found sufficiently watered, it may be laid in a heap for 12, 18, or 24 hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unskilful hands.

After the flax is taken out of the canal, fresh lint should

Flax.

Flax. should not be put a second time into it, until the former water be run off, and the canal cleaned, and supplied with fresh water.

Of Graffing FLAX. Short heath is the best field for graffing flax; as, when wet, it fastens to the heath, and is thereby prevented from being blown away by the wind. The heath also keeps it a little above the earth, and so exposes it the more equally to the weather. When such heath is not to be got, links or clean old lea-ground is the next best. Long-grass grounds should be avoided, as the grass growing thro' the lint frequently spots, tenders, or rots it; and grounds exposed to violent winds should also be avoided.

The flax, when taken out of the water, must be spread very thin upon the ground; and being then very tender, it must be gently handled. The thinner it is spread the better, as it is then the more equally exposed to the weather. But it ought never to be spread during a heavy shower, as that would wash and waste the harle too much, which is then excessively tender, but soon after becomes firm enough to bear the rains, which, with the open air and sunshine, cleans, softens, and purifies the harle to the degree wanted, and makes it blither from the boon. In short, after the flax has got a little firmness by being a few hours spread in dry weather, the more rain and sunshine it gets the better.

If there be little danger of high winds carrying off the flax, it will be much the better of being turned about once a-week. If it is not to be turned, it ought to be very thin spread. The spreading of flax and hemp requires a deal of ground, and enriches it greatly.

The skilful flax-raiser spreads his first row of flax at the end of the field opposite to the point from whence the most violent wind commonly comes, placing the root-ends foremost; he makes the root-ends of every other row over-lap the crop-ends of the former row three or four inches, and binds down the last row with a rope; by which means the wind does not easily get below the lint to blow it away: and as the crop-ends are seldom so fully watered as the root-ends, the aforefaid overlapping has an effect like giving the crop-ends more watering. Experience only can fully teach a person the signs of flax being sufficiently graffed: then it is of a clearer colour than formerly; the harle is blithered up, and easily parts with the boon, which is then become very brittle. The whole should be sufficiently graffed before any of it is lifted; for if a part be lifted sooner than the rest, that which remains is in great danger from the winds.

A dry day ought to be chosen for taking up the flax; and if there is no appearance of high wind, it should be loosed from the heath or grass, and left loose for some hours, to make it thoroughly dry.

As a great quantity of flax can scarcely be all equally watered and graffed, and as the different qualities will best appear at lifting the flax off the grass; therefore at that time each different kind should be gathered together, and kept by itself; that is, all of the same colour, length, and quality.

The smaller the beets lint is made up in, the better for drying, and the more convenient for stacking, housing, &c. and in making up these beets, as in every other operation upon flax, it is of great consequence that the lint be laid together as it grew, the root-ends together, and the crop-ends together.

Follows an estimate of the Expence, Produce, and Profit of a Scots Acre of FLAX,—supposing the season favourable, that no accidental losses happen, and that the farmer is neither unskilful nor negligent.

	<i>A medium crop.</i>	<i>A great crop.</i>	<i>An extra. crop.</i>
Ground-rent, labouring the ground, and leading the flax	L. 2 10 0	L. 3 10 0	L. 5 0 0
Lintseed from L. 2. to L. 4. per hogshead, the medium	1 16 8	1 10 0	1 6 8
3 s. 4 d. per peck	for 11 pecks.	for 9 pecks.	for 8 pecks.
Clodding and sowing	0 2 0	0 2 0	0 2 0
Weeding	0 12 0	0 8 0	nothing.
Pulling, rippling, putting in, and covering in the water	0 14 0	0 15 0	1 0 0
Taking out of the water, graffing, and stacking	0 8 0	0 12 0	0 18 0
Breaking and scutching, at 2 s. per stone	3 0 0	4 0 0	6 0 0
	for 30 stones.	for 40 stones.	for 60 stones.
Total expence	L. 9 2 8	L. 10 17 0	L. 14 6 8
Produce at 10 s. per stone	L. 15 0 0	L. 20 0 0	L. 30 0 0
Lintseed fold for oil at 1 s. per peck	for 30 stones.	for 40 stones.	for 60 stones.
The chaff of the bolls is well worth the expence of drying the feed; as it is good food, when boiled and mixed with beer, for horses.	0 16 0	0 18 0	1 0 0
Total produce	L. 15 16 0	L. 20 18 0	L. 31 0 0
Balance for profit	L. 6 14 4	L. 10 1 0	L. 16 13 4

Flax.

There is nothing stated here as expence of the canal in which the flax is watered; because that varies much according to the conveniences people have for making it; and a canal once made requires for after years only to be repaired and cleansed.

It is a certain fact, that the greater the crop is, the better is the quality of the same kind of flax.

The advantage of having both a crop of flax and a crop of turnip the same year—or of sowing grafs-seeds along with the lintseed—and of reducing the ground to a fine garden mould, free of weeds, ought to be attended to.

For Cambric and fine Lawn. The ground must be a rich light soil, rather sandy, but cannot be too rich.

It ought to be ploughed in September, or the beginning of October, first putting a little hot rotten dung upon it. In January it ought to have a second ploughing, after a hard frost; and when you intend to sow it, plough it a third time, or rather hoe it, reducing the clods very fine; but make no furrows: the land must be made level like a garden; but never work the land when wet.

The seed should be sown the beginning of April, and about double the quantity that is generally sown by our farmers; if the land be very rich, it will require rather more than double.

As soon as sown (if the weather be dry) it will be necessary to roll the ground.

The lint must be weeded very clean when about three inches high; directly after which you must set forked sticks, of about one-and-half inch thick (which ought to be prepared before), every four or five feet, according to the length of the poles you are to lay upon them; they should be well fixed in the ground, the forked part to receive the poles about six or seven inches above the lint; each row of poles should be two, three, or four feet asunder, according to the length of the brushwood you are to lay upon them.

The poles ought to be from 10 to 15 feet long, and strong enough to support the brush across the poles; take the longest brushwood you can get, the more branchy the better, very thick, filling up the vacancies with smaller brush, and any of the branches that rise higher than 18 or 20 inches ought to be lopt off to make the brush lie as level as possible: any sort of brush will do except oak, as that tinges the lint.

Your lint must be pulled as soon as the seed is fully formed, which is a few days after it is out of the bloom, before the lint turn yellow.

It must be pulled above the brushwood, and every handful laid upon it as soon as possible: if it is fine weather, leave it four or five hours in that manner; then carry it to a screen near a barn, to put it under cover in case of rain; there it must be spread four or five days, and always put in the barn at night, or when it appears to rain: the bundles must be opened in the barn, or made hollow, to prevent it from heating.

These operations must be performed until the lint is perfectly dry, and out of danger of heating; taking care all the time to keep the roots as even as possible, and if possible keep it from rain or wet: if you cannot prevent it from being wet, it will be better to leave it on the grafs till dry; because when once wet, the putting it under cover before dry will make it turn black; a thing which must be prevented at all events.

Flax.

If any of the lint upon the border, or through the piece of ground, be coarser than another, it must be separated from the rest.

The utmost care must be taken to preserve the lint entire or unbroken; for this reason they beat off the seed with a round mell or bittle.

The most proper ground is summer fallow, or after potatoes or lea; if possible near a wood, to prevent the expence of carrying brush.

As soon as the seed is off, if you intend to water it that season, it must be tied in bundles about as large as you can grasp with your two hands.

The water proper for it, is a very small rivulet or soft spring free of any metallic ore; taking care that no flood or foul water enters your pit; which must be at least five feet deep, about nine or ten broad at the top, and seven or eight at the bottom; the length will depend on the quantity of flax you have to water. A very small stripe of water, when clear, should always be running in and off from your pit when the lint is in it.

The pit ought to be made three or four months before it be used.

You must drive poles about four inches thick, with a hook inclining downwards, in this form 7, all along the sides of the pit, above five feet asunder. The hooks must be level with, or rather under, the surface of the water. A long pole, the whole length of the pit, must be fixed into these hooks on each side; and cross poles put under that, to keep the lint under water; but the cross poles are not used till the lint is put in. You must order it so, that all the lint should be three or four inches under water. You next bring your lint to the sides of the pit; then put your sheaves head to head, causing each to overlap the other about one third, and take as many of these as make a bundle of two or two and a half feet broad, laying the one above the other till it is about four or four and a half feet high; then you tie them together in the middle, and at each root-end: after this, you wrap your bundle in straw, and lay it in the water, putting the thin or broad side undermost, taking care that none of your lint touch the earth; after it is fully pressed under water, put in your cross poles to keep it under. The bundles ought to lie in the pit a foot separate from each other. This renders it easy to take out; for, if the bundles entangle, they will be too heavy to raise.

The time of watering depends so much upon the weather, and softness or hardness of the water, that it is impossible to fix any certain time. This must be left to the skill of the farmer. If the flax be intended for spinning yarn soft and fit for cambric, it ought to be spread upon short grafs for four or five days before you put it into the water; but if for lawns, lace, or thread, it is best to dry it outright. In either case, avoid as much as possible to let it get rain; as much rain blanches, and washes out the oil, which is necessary to preserve the strength.

The great property of this flax is to be fine and long. Thick sowing raises all plants fine and slender; and when the ground is very rich, it forces them to a great length. Pulling green prevents that coarseness which flax has when let stand till it be full ripe, and gives it the fine silky property. The brushwood, when the flax springs up, catches it by the middle,

dle.

Flax. dle, prevents it from lying down and rotting; infallible consequences of sowing thick upon rich ground. It likewise keeps it straight, moist, and soft at the roots; and by keeping it warm, and shaded from the sun, greatly promotes its length. The keeping it from rain, heating, taking proper care of your water, preserves the colour, and prevents those bars in cloth so much complained of by bleachers.

FLAX-Dressing. For many ages it was the practice to separate the boon or core from the flax, which is the bark of the plant, by the following simple *hand methods*. First, for breaking the boon, the stalks in small parcels were beat with a mallet; or, more dexterously, the *break* (Plate CXCIV. fig. 1. and 2.) was used thus: The flax being held in the left-hand across the three *under-teeth* or *swords* of the break (*A*, fig. 1. and *a*, fig. 2.), the *upper-teeth* (*B*, fig. 1. and *b*, fig. 2.) were with the right-hand quickly and often forced down upon the flax, which was artfully shifted and turned with the left hand. Next, for clearing the flax of the broken boon: the workman with his left-hand held the flax over the *stock* (fig. 3. and 4.), while with his right-hand he struck or threshed the flax with the *scutcher* (fig. 5.)

These methods of breaking and scutching the flax being slow and very laborious, a *water-mill* was invented in Scotland about 40 years ago; which, with some late improvements, makes great dispatch, and in skilful and careful hands gives satisfaction. It has been generally constructed to break the boon by three dented rollers, placed one above the other. The middle one of which, being forced quickly round, takes the other two along with it, and one end of the handfuls of the flax being by the workmen directed in between the upper and middle rollers, the flax is immediately drawn in by the rollers; a curved board or plate of tin behind the rollers directs the flax to return again between the middle and undermost rollers;—and thus the operation is repeated until the boon be sufficiently broke. Great weights of timber or stone at the ends of levers, press the upper and under rollers towards the middle one.

The scutching is next carried on by the mill in the following manner: Four arms, something like the hand-scutchers before described, project from a perpendicular axle; a box around the axle incloses these projecting scutchers; and this box is divided among the workmen, each having sufficient room to stand and handle his flax, which, through slits in the upper part and sides of the box, they hold in to the stroke of the scutchers; which, moving round horizontally, strike the flax across or at right angles, and so thresh out or clear it of the boon.

The breaking of the flax by *rollers* is scarcely subject to any objection, but that it is dangerous to workmen not sufficiently on their guard, who sometimes allow the rollers to take hold of their fingers, and thereby their whole arm is instantly drawn in: thus many have lost their arms. To avoid this danger, a break, upon the general principles of the hand-break before described, has been lately adapted to water-machinery, and used in place of rollers. The horizontal stroke of the scutchers was long thought too severe, and wasteful of the flax; but very careful ex-

periments have discovered that the waste complained of must be charged to the unskilfulness or negligence of the workmen, as in good hands the mill carries away nothing but what, if not so scutched off, must be taken off in the heckling with more loss both of time and flax. But to obviate this objection of the violence of the *horizontal scutchers*, an imitation of hand-scutching has lately been applied to water. The scutchers then project from an horizontal axle, and move like the arms of a check-reel, striking the flax neither across nor perpendicularly down, but sloping in upon the parcel exactly as the flax is struck by the hand-scutcher. This sloping stroke is got by raising the scutching-stock some inches higher than the centre of the axle; and by raising or lowering the stock, over which the flax is held, or screwing it nearer to or farther from the scutchers, the workman can temper or humour the stroke almost as he pleases.

A lint-mill, with horizontal scutchers upon a perpendicular axle, requires a house of two stories, the rollers or break being placed in the ground story, and the scutchers in the loft above; but a mill with vertical scutchers on an horizontal axle, requires but one ground story for all the machinery.

Another method of breaking and scutching flax, more expeditious than the old hand-methods, and more gentle than water-mills, has also been lately invented in Scotland. It is much like the break and scutcher giving the sloping stroke last described, moved by the foot. The treddle is remarkably long, and the scutchers are fixed upon the rim of a fly-wheel. The foot-break is also assisted in its motion by a fly. These foot-machines are very useful where there are no water-mills, but they are far inferior to the mills in point of expedition.

The next operation that flax undergoes after scutching is heckling. The *heckle* (fig. 6.) is firmly fixed to a bench before the workman, who strikes the flax upon the teeth of the heckle, and draws it through the teeth. To persons unacquainted with that kind of work this may seem a very simple operation; but, in fact, it requires as much practice to acquire the slight of heckling well, and without wasting the flax, as any other operation in the whole manufacture of linen. They use coarser and wider teathed heckles, or finer, according to the quality of the flax; generally putting the flax through two heckles, a coarser one first, and next a fine one.

Flax for cambric and fine lawn, thread, and lace, is dressed in a manner somewhat different. It is not scutched so thoroughly as common flax; which from the scutch proceeds to the heckle, and from that to the spinner: whereas, this fine flax, after a rough scutching, is scraped and cleansed with a blunt knife upon the workman's knee covered with his leather-apron; from the knife it proceeds to the spinner, who, with a brush made for the purpose, straightens and dresses each parcel just before she begins to spin it.

The following observations, first published in the Gentleman's Magazine for June 1787, seem worthy of very particular attention, and may not therefore be improperly subjoined as a supplement to the present article.

Of the watering of Flax by a new method, so as to shorten labour, to add probably to the strength of the flax, and to give it a much finer colour, which would render the operation of bleaching safer and less tedious.

"Though the following reflections have for their object an improvement in the very essential article of watering of flax, yet I must advertise the reader, that they are only theory, and must depend entirely for their truth and justification upon future experiments, skilfully and judiciously made. Should repeated trials prove the advantage of the new method proposed, we may venture to affirm, that it would be an improvement that would increase the national income in the agricultural branch many thousand pounds annually, would add greatly to the perfection of the linen manufacture, and over and above would suppress a very disagreeable nuisance, which the present method of watering flax occasions during some part of the summer in every flax-growing country.

"The intention of watering flax is, in my opinion, to make the boon more brittle or friable, and, by soaking, to dissolve that gluey kind of sap that makes the bark of plants and trees adhere in a small degree to the woody part. The bark of flax is called the *harle*; and when separated from the useless woody part, the *boon*, this harle itself is called flax. To effect this separation easily, the practice has long prevailed, of soaking the flax in water to a certain degree of fermentation, and afterwards drying it. For this soaking some prefer rivulets that have a small current, and others stagnant water in ponds and lakes. In both methods the water acts as in all other cases of infusion and maceration; after two or three weeks it extracts a great many juices of a very strong quality, which in ponds give the water an inky tinge and offensive smell; and in rivulets mix in the stream and kill the fish. Nay, if this maceration be too long continued, the extracted and fermented sap will completely kill the flax itself. For if, instead of two or three weeks, the new flax were to lie soaking in the water four or five months, I presume it would be good for nothing but to be thrown upon the dunghill; both harle and boon would in time be completely rotted; yet the harle or flax, when entirely freed from this sap, and manufactured into linen, or into ropes, might lie many months under water without being much damaged; as linen, it may be washed and steeped in scalding water twenty times without losing much of its strength; and as paper, it acquires a kind of incorruptibility.

"It appears then essential to the right management of new flax, to get rid of this pernicious vegetative sap, and to macerate the boon; but from the complaints made against both the methods of watering now in use, there is reason to think that there is still great room for improvement in that article. In rivulets, the vegetative sap, as it is dissolved, is carried off by the current, to the destruction of the fish. This prevents the flax from being stained; but the operation is tedious, and not complete, from the uncertainty of knowing when it is just enough, and not too much, or perhaps from neglect. In ponds, the inky tinge of the water often serves as a kind of dye to the flax, which imbibes it so strongly, that double the labour in bleaching will hardly bring the linen made of such flax to an equality in whiteness with linen made of

flax untinged. This seems to be equally unwise as though we were to dye cotton black first, in order to whiten it afterwards. These ponds, besides, become a great nuisance to the neighbourhood; the impregnated water is often of such a pernicious quality, that cattle, however thirsty, will not drink of it; and the effluvia of it may perhaps be nearly as infectious as it is offensive. If this effluvia is really attended with any contagious effects in our cold climate, a thing worth the enquiring into, how much more pernicious must its effects have been in the hot climate of Egypt, a country early noted for its great cultivation of flax?

"I have often thought that the process of watering might be greatly improved and shortened by plunging the new flax, after it is rippled, into scalding water; which, in regard to extracting the vegetative sap, would do in five minutes more than cold water would do in a fortnight, or perhaps more than cold water could do at all, in respect to the clearing the plant of sap. Rough almonds, when thrown into scalding water, are blanched in an instant; but perhaps a fortnight's macerating those almonds in cold water would not make them part so easily with their skins, which are the same to them as the harle is to the flax. Were tea leaves to be infused in cold water a fortnight, perhaps the tea produced by that infusion would not be so good to the taste, nor so strongly tinged to the eye, as what is effected by scalding water in five minutes. By the same analogy, I think, flax or any small twig would be made to part with its bark much easier and quicker by being dipped in boiling water than by being steeped in cold water.

"This reflection opens a door for a great variety of new experiments in regard to flax. I would therefore recommend to gentlemen cultivators and farmers, to make repeated trials upon this new system, which would soon ascertain whether it ought to be adopted in practice or rejected. One thing, I think, we may be certain of, that if the Egyptians watered their flax in our common manner, they undoubtedly watered it in *very warm water*, from the great heat of their climate, which would probably make them neglect to think of water heated by any other means than that of the sun. A good general practice can only be established upon repeated trials. Though one experiment may fail, another with a little variation may succeed; and the importance of the object desired to be obtained will justify a good degree of perseverance in the prosecution of the means. In this view, as the Chinese thread is said to be very strong, it would be worth while to be acquainted with the practice of that distant nation, in regard to the rearing and manufacturing of flax, as well as with the methods used by the Flemings and the Dutch.

"Boiling water perhaps might at once clear the new flax from many impurities, which when not removed till it be spun into yarn, are then removed with difficulty, and with loss of substance to the yarn. Why should not the longitudinal fibres of the flax, before they be spun into yarn, be made not only as *fine* but as *clean* as possible? Upon the new system proposed, the act of bleaching would begin immediately after the rippling of the flax; and a little done then, might perhaps save much of what is generally done after the spinning and weaving. To spin dirty flax with a view

Flax.

of cleaning it afterwards, appears to be the same impropriety as though we were to reserve part of the dressing given to leather till after it is made into a glove.

"Should the plunging of the flax into the boiling water not suffice to make the boon brittle enough, as I am inclined to think it would not, then the common watering might be added; but in that case probably half the time usually given to this watering would suffice, and the flax might then be laid in clear rivulets, without any apprehension of its infecting the water and poisoning the fish, or of being discoloured itself; for the boiling water into which it had been previously put, would have extracted all the poisonous vegetative sap, which I presume is what chiefly discolours the flax or kills the fish.

"On the supposition, that the use of boiling water in the preparation of flax may be found to be advantageous and profitable, I can recollect at present but one objection against its being generally adopted. Every flax grower, it may be said, could not be expected to have conveniences for boiling water sufficient for the purpose; the consumption of water would be great; and some additional expence would be incurred. In answer to this, I shall observe, that I presume any additional expence would be more than reimbursed by the better marketable price of the flax; for otherwise any new improvement, if it will not quit cost, must be dropt, were it even the searching after gold. In a large cauldron a great deal of flax might be dipt in the same water, and the consumption perhaps would not be more than a quart to each sheaf. Even a large household pot would be capable of containing one sheaf after another; and I believe the whole objection would be obviated, were the practice to prevail with us, as in Flanders and Holland, that the flax-grower and the flax-dresser should be two distinct professions.

"I shall conclude with recommending to those who are inclined to make experiments, not to be discouraged by the failure of one or two trials.—Perhaps the flax, instead of being just plunged into the scalding water, ought to be kept in it five minutes, perhaps a quarter of an hour, perhaps a whole hour. Should five minutes, or a quarter of an hour, or an hour, not be sufficient to make the boon and harle easily separate, it might perhaps be found expedient to boil the flax for more than an hour; and such boiling when in this state might in return save several hours boiling in the article of bleaching. It is not, I think, at all probable that the boiling of the flax with the boon in it would prejudice the harle; for in the course of its future existence, it is made to be exposed 20 or 40 times to this boiling trial; and if not detrimental in the one case, it is to be presumed it would not be detrimental in the other. Perhaps, after the boiling, it would be proper to pile up the flax in one heap for a whole day, or for half a day, to occasion some fermentation; or perhaps, immediately after the boiling, it might be proper to wash it with cold water. The great object, when the flax is pulled, is to get the harle from the boon with as little loss and damage as possible; and if this is accomplished in a more complete manner than usual, considerable labour and expence will be saved in

the future manufacturing of the flax. On this account I think much more would be gained than lost, were the two or three last inches of the roots of the stems to be chopped off, or clipt off, previous to the flax being either watered or boiled. When the flax is watered, care should be taken not to spread it out to dry, when there is a hazard of its being exposed in its wet state to frost."

Flax made to resemble Cotton. In the Swedish Transactions for the year 1747, a method is given of preparing flax in such a manner as to resemble cotton in whiteness and softness, as well as in coherence. For this purpose, a little sea-water is to be put into an iron pot or an untinned copper-kettle, and a mixture of equal parts of birch-ashes and quicklime strewed upon it: A small bundle of flax is to be opened and spread upon the surface, and covered with more of the mixture, and the stratification continued till the vessel is sufficiently filled. The whole is then to be boiled with sea-water for ten hours, fresh quantities of water being occasionally supplied in proportion to the evaporation, that the matter may never become dry. The boiled flax is to be immediately washed in the sea by a little at a time, in a basket, with a smooth stick at first while hot; and when grown cold enough to be borne by the hands, it must be well rubbed, washed with soap, laid to bleach, and turned and watered every day. Repetitions of the washing with soap expedite the bleaching; after which the flax is to be beat, and again well washed; when dry, it is to be worked and carded in the same manner as common cotton, and pressed betwixt two boards for 48 hours. It is now fully prepared and fit for use. It loses in this process near one-half its weight, which is abundantly compensated by the improvement made in its quality.

The filamentous parts of different vegetables have been employed in different countries for the same mechanic uses as hemp and flax among us. See FILAMENT.

Earth-Flax. See AMIANTHUS.

New-Zealand Flax-Plant. See PHORMIUM.

Toad-Flax. See LINARIA.

FLEA, in zoology: See PULEX.

FLEA-Bane, in botany. See CONYZA.

FLEA-Bitten, that colour of a horse which is white or grey, spotted all over with dark reddish spots.

FLEAM, in surgery and farriery, an instrument for letting blood of a man or horse. A case of fleams, as it is called by farriers, comprehends six sorts of instruments; two hooked ones, called *drawers*, and used for cleaning wounds; a pen-knife; a sharp-pointed lancet for making incisions; and two fleams, one sharp and the other broad-pointed. These last are somewhat like the point of a lancet, fixed in a flat handle, and no longer than is just necessary to open the vein.

FLECHIER (Esprit), bishop of Nîmes, one of the most celebrated preachers of his age, and the publisher of many panegyrics and funeral orations, was born at Perne in Avignon in 1632. He was nominated to the bishopric of Lavaur in 1685, and translated to Nîmes in 1687. At this latter place he founded an academy, and took the presidentship upon himself: his own palace was indeed a kind of academy, where he applied

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applied himself to train up orators and writers, who might serve the church, and do honour to the nation. He published, besides his panegyrics and funeral orations, 1. An History of the Emperor Theodosius, that of Cardinal Ximenes, and that of Cardinal Commendon. 2. Several Sermons. 3. Miscellaneous Works. 4. Letters, &c. He died in 1710.

FLECKNOE (Richard), an English poet in the reign of Charles II. more remarkable for Mr Dryden's satire on him than for any works of his own. He is said to have been originally a jesuit, and to have had good English connections in the Catholic interest. When Dryden lost the place of poet-laureat on the revolution, its being conferred on Flecknoe, for whom he had a settled aversion, gave occasion to his poem intitled *Mac Flecknoe*; one of the best written satires in our language, and from which Pope seems to have taken the hint for his *Dunciad*. Flecknoe wrote some plays; but could never get more than one of them acted, and that was damned.

FLEECE, the covering of wool shorn off the bodies of sheep. See *Wool*.

Golden FLEECE. See *ARGONAUTS*, and *GOLDEN Fleece*.

FLEET, commonly implies a company of ships of war, belonging to any prince or state: but sometimes it denotes any number of trading ships employed in a particular branch of commerce.

The admirals of his Britannic majesty's fleet are divided into three squadrons, viz. the red, the white, and the blue. When any of these officers are invested with the command of a squadron or detachment of men of war, the particular ships are distinguished by the colours of their respective squadron: that is to say, the ships of the red squadron wear an ensign whose union is displayed on a red field; the ensigns of the white squadron have a white field; and those of the blue squadron a blue field; the union being common to all three. The ships of war, therefore, are occasionally annexed to any of the three squadrons, or shifted from one to another.

Of whatsoever number a fleet of ships of war is composed, it is usually divided into three squadrons; and these, if numerous, are again separated into divisions. The admiral, or principal officer, commands the centre; the vice-admiral, or second in command, superintends the van-guard; and the operations of the rear are directed by the rear-admiral, or the officer next in rank. See the article *DIVISION*.

The disposition of a fleet, while proceeding on a voyage, will in some measure depend on particular circumstances; as the difficulty of the navigation, the necessity of dispatch, according to the urgency or importance of the expedition, or the expectation of an enemy in the passage. The most convenient order is probably to range it into three lines or columns, each of which is parallel to a line close-hauled according to the tack on which the line of battle is designed to be formed. This arrangement is more useful than any, because it contains the advantages of every other form, without their inconveniences. The fleet being thus more inclosed will more readily observe the signals, and with greater facility form itself into the line of battle;

a circumstance which should be kept in view in every order of sailing. See *Naval TACTICS*.

FLEET, is also a noted prison in London, where persons are committed for contempt of the king and his laws, particularly of his courts of justice: or for debt, where any person will not or is unable to pay his creditors.

There are large rules and a warden belonging to the fleet prison; which had its name from the float or fleet of the river or ditch, on the side whereof it stands.

FLEETWOOD (William), a very learned English bishop in the beginning of the 18th century, of an ancient family in Lancashire. He distinguished himself during king William's reign, by his *Inscriptionum Antiquarum Sylloge*, by several sermons he preached on public occasions, and by his *Essay on Miracles*. He was designed by king William to a canonry of Windsor. The grant did not pass the seals before the king's death; but the queen gave it him, and he was installed in 1702. In 1703, he took a resolution to retire; and in 1707, published, without his name, his *Chronicon Pretiosum*. In 1708, he was nominated by the queen to the see of St Asaph. The change of the queen's ministry gave him much regret. In 1715, he published a pamphlet intitled "The 13th chapter of the Romans vindicated from the abusive senses put upon it." In 1714 he was translated to the bishopric of Ely; and died in 1723, aged 67. He published several other sermons and tracts, and was a man of great learning and exemplary piety.

FLEMINGIANS, or FLANDRIANS, in ecclesiastical history, a sect of rigid anabaptists, who acquired this name in the 16th century, because most of them were natives of Flanders, by way of distinction from the WATERLANDIANS. In consequence of some dissensions among the Flemings relating to the treatment of excommunicated persons, they were divided into two sects, distinguished by the appellations of *Flandrians* and *Frieslandians*, who differed from each other in their manners and discipline. Many of these in process of time came over to the moderate community of the Waterlandians, and those who remained separate are still known by the name of the Old Flemings or Flandrians; but they are comparatively few in number. These maintain the opinion of Menno with respect to the incarnation of Christ; alleging, that his body was produced by the creating power of the Holy Ghost, and not derived from his mother Mary.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwise call *Low Dutch*, to distinguish it from the *German*, whereof it is a corruption and a kind of dialect. See *GERMAN*.

It differs from the *Walloon*, which is a corruption of the French language. The Flemish is used through all the provinces of the Netherlands.

FLEMISH-Bricks, a neat, strong, yellow kind of bricks, brought from Flanders, and commonly used in paving yards, stables, &c. being preferable for such purposes to the common bricks. See the article *BRICKS*.

FLESH, in anatomy, a compound substance, consisting of the various softer solids of the animal body, and so denominated in contradistinction to bones. See *ANATOMY*, *passim*.

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FLESH is also used, in theology, in speaking of the mysteries of the incarnation and eucharist. "The Word was made *flesh*," *Verbum caro factum est*.

The Romanists hold, that the bread in the sacrament of the supper is turned into the real flesh of Jesus Christ. See TRANSUBSTANTIATION.

FLESH is sometimes also used by botanists for the soft pulpy substance of any fruit, inclosed between the outer rind or skin and the seeds or stone; or for that part of a root, fruit, &c. fit to be eaten.

FLESH-Colour. See CARNATION.

FLETA, the name given to an unknown writer who lived about the end of the reign of Edward II. and beginning of Edward III. and who being a prisoner in the Fleet, wrote there an excellent treatise on the common law of England.

FLETCHER. See BEAUMONT and Fletcher.

FLETCHER (Andrew) of Salton, a celebrated Scots patriot and political writer, was descended from an ancient family who trace their origin to one of the followers of William the Conqueror. He was the son of Sir Robert Fletcher of Salton and Innerpeffer, and born in the year 1650. The tuition of our author was committed by his father, on his death-bed, to Mr (afterwards Bishop) Burnet, then his parish-minister; by whose care he received a pious, learned, and polite education. Endowed with uncommon genius, and possessed of virtues and abilities peculiarly suited to the times in which he lived, Mr Fletcher quickly shone forth the ornament of his country, and the champion of its freedom. Having in the course of his classical studies and historical reading been impressed with an enthusiastic admiration both of ancient and modern republics, he had early contracted an ardent love of liberty, and an aversion to arbitrary rule. Hence his spirit the more readily took alarm at certain measures in the reign of Charles II. Being knight of the shire for Lothian to that parliament where the duke of York was commissioner, he openly opposed the designs of that prince and the bill of accession. He had a share with lord viscount Stair in framing the test-act, by which the duke of York complained that he lost Scotland. On these accounts he became peculiarly obnoxious to the duke; and was at last obliged to flee to Holland, to avoid the fatal consequences of prosecutions which on various pretences were commenced against him. Being cited before the privy-council and judiciary courts, and not appearing, he was declared traitor, and his estate confiscated.

In Holland he and Mr Baillie of Jerviswood were the only persons whom the earl of Argyre consulted concerning the designs which were then in agitation. In 1681 they came over to England, in order to concert matters with their party in that country; and were the only two who were intrusted so far as to be admitted to the secrets of lord Russell's council of six. Mr Fletcher managed his part of the negociation with so much address, that administration could find no pretext for seizing him: nor could they fix upon him those articles on account of which Mr Baillie was condemned; to whose honour let it be remembered, that although offered a pardon on condition of his accusing his friend, he persisted in rejecting the proposal with indignation.

Mr Fletcher having joined the duke of Monmouth

upon his landing, received a principal command under him. But the duke was deprived of his services on the following occasion, as related by Sir John Dalrymple. Being sent upon an expedition, and not esteeming "times of danger to be times of ceremony," he had seized for his own riding the horse of a country gentleman [the mayor of Lynne] which stood ready equipt for its master. The master, hearing this, ran in a passion to Fletcher, gave him opprobrious language, shook his cane, and attempted to strike. Fletcher, though rigid in the duties of morality, yet having been accustomed to foreign services both by sea and land, in which he had acquired high ideas of the honour of a soldier and a gentleman, and of the affront of a cane, pulled out his pistol, and shot him dead on the spot. The action was unpopular in countries where such refinements were not understood. A clamour was raised against it among the people of the country: in a body they waited upon the duke with their complaints; and he was forced to desire the only soldier, and almost the only man of parts, in his army, to abandon him. With Fletcher all Monmouth's chance of success in war left him." But, in a manuscript memoir belonging to the family, we have the following notice concerning Mr Fletcher's connection with Monmouth, in which his separation from that prince is very differently accounted for: "To lord Marischal Mr Fletcher explained the motives which induced him first to join, and afterwards abandon, the duke of Monmouth. The former he ascribed to the duke's manifesto in Scotland relating to religion, and in England to liberty. For the latter he accounted by the disgust produced in his own mind and that of his associates, when the duke declared himself king, and broke faith with all who embarked with him on his principles. He complained heavily of the account commonly given of the death of the mayor of Lynne; and mentioned to lord Marischal, in proof of the contrary, that he did not leave the duke till he came to Taunton, where he was proclaimed king, several weeks after the death of the mayor of Lynne."

Seeing all the efforts of himself and his friends in favour of liberty frustrated at Taunton, he endeavoured to secure his own personal freedom by taking his passage in the first ship bound to a foreign country. It was his misfortune to land in Spain; where he was immediately arrested, cast into prison, and guarded by three different bands of soldiers, till a vessel should be prepared to carry him a victim in chains to the court of London. But on the morning before the ship could sail, whilst he looked pensive through the bars that secured the window of his room, he was hailed by a venerable personage who made signs to speak with him. The prison-doors he found open; and whilst his friendly conductor waved to him to follow him, he passed through three different guards of soldiers all fast asleep. Without being permitted to offer his thanks to his deliverer, he found himself obliged to prosecute with all speed the journey, in which he was directed by a person concerning whom he could never collect any information; and in disguise he proceeded in safety through Spain. He felt a peculiar pleasure in relating to his friends instances of the care of Providence which he had experienced during his exile; and entertained them often with narratives of this kind, which he always mingled with

Fletcher.

Memoirs of
Great Britain and Ire-
land.

Memoirs of
the family of
Salton. MS.

Fletcher. with religious reflections. Of these, another may be here mentioned. Happening in the evening to pass the skirt of a wood at a few miles distance from a city where he intended to lodge, he came to a place where two roads met. After he had entered upon the road on the right, he was accosted by a female of a respectable figure, who warned him to turn back, and take the road on the left; for that in the other there was danger which he could not escape if he continued to proceed. His friendly monitor suddenly retired into the wood, out of which she had issued no less unexpectedly. Having arrived at the city, the inhabitants were soon after alarmed by an account of the robbery and murder of several travellers who that evening had fallen into the hands of a banditti upon the very way in which he had intended to travel. From these and other instances of preservation from dangers, the devotion of his mind, habituated from his infancy to an intercourse with heaven, led him to conclude that he was in a peculiar manner the care of Providence, and that in critical cases his understanding received its direction from a supernatural impulse.

During his exile, he maintained a frequent and extensive correspondence with the friends of liberty at home; and he partly employed himself in making a curious collection of books, which compose the best private library in Scotland. But his genius also prompted him to engage in more active employments. He repaired to Hungary, and served several campaigns as a volunteer under the duke of Lorrain with great reputation. At length, understanding that the great design then projecting in Holland, and upon the issue of which he considered the liberties of Britain to be suspended, had attained a considerable degree of maturity, he hastened thither; where his counsels and address were of eminent service. He came over with king William; and in zeal, activity, penetration, and political skill, proved inferior to none of the leaders in the Revolution.

Such, however, was his magnanimity, that from a survey of King William's papers it appears, that while others laboured to turn this grand event to the emolument of themselves and the aggrandisement of their family, Mr Fletcher asked nothing. His estate had been forfeited, and his house abandoned to military discretion; his fortune was greatly shattered, and his family reduced to circumstances of distress. Nothing was given him in recompence of all his sufferings. On the contrary, he, together with the duke of Hamilton, was distinguished by marks of royal and ministerial dislike. Still, whatever private resentment he might entertain, it appeared that his ruling principle was the good of his country; and that to this grand object of his heart he was willing to sacrifice all personal considerations. For when, in 1692, the abdicated king meditated an invasion, Mr Fletcher addressed a letter (preserved in Sir John Dalrymple's Collection) to the duke of Hamilton, in which every argument is employed with skill and energy to engage his Grace to forget his injuries, and in the present crisis to employ the extensive influence and authority he then possessed in the cause of freedom and of his country. This letter produced its full effect; and the duke returned to his duty, from which he had in part begun to deviate.

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To follow our author through all the mazes of his political life subsequent to the Revolution, is beyond our purpose, and would exceed our limits. One or two circumstances more shall therefore suffice. Being elected a member for the parliament 1683, he showed an uniform zeal for the interest of his country. The thought of England's domineering over Scotland was what his generous soul could not endure. The indignities and oppression which Scotland lay under galled him to the heart; so that in his learned and elaborate discourses, he exposed them with undaunted courage and pathetic eloquence.—In that great event, the Union, he performed essential service. He got the act of security passed, which declared that the two crowns should not pass to the same head till Scotland was secured in her liberties civil and religious. Therefore lord Godolphin was forced into the Union, to avoid a civil war after the queen's demise. Although Mr Fletcher disapproved of some of the articles, and indeed of the whole frame of the Union; yet, as the act of security was his own work, he had all the merit of that important transaction.

We must not omit mentioning, that in the ardor of his political career Mr Fletcher forgot not the interests of the place that gave him birth. He esteemed the education of youth one of the noblest objects of government. On this subject he wrote a treatise, still extant, most characteristic of himself; and he established at Salton a foundation for the same purpose, of great utility while it lasted.

This great man died at London in 1716, aged 66. His remains were conveyed to Scotland, and deposited in the family vault at Salton.

That Mr Fletcher received neither honours nor emoluments from king William, may perhaps be in part attributed to himself; a circumstance, however, which must add greatly to the lustre of his character. His uncompromising virtue, and the sternness of his principles, were ill calculated to conciliate courtly favour. He was so zealous an assertor of the liberties of the people, that he was too jealous of the growing power of all princes; in whom he thought ambition so natural, that he was not for trusting the best of kings with the power which ill ones might make use of against their subjects: he was of opinion that all princes were made by, and for the benefit of, the people; and that they should have no power but that of doing good. This, which made him oppose king Charles and invade king James, led him also to oppose the giving so much power to king William, whom he would never serve after his establishment. So we are told by the author of *Short Political Characters*, a MS. in the library of the late T. Rawlinson, Esq.—Mr Lockhart, in his *Memoirs*, p. 72. expresses a belief that his aversion to the English and to the Union was so great, that, in revenge to them, he was inclined to side with the abdicated family: "But (adds he) as that was a subject not fit to be entered upon with him, this is only a conjecture from some inuendos I have heard him make: but so far is certain, he liked, commended, and conversed with high-flying Tories, more than any other set of men; acknowledging them to be the best countrymen, and of most honour, integrity, and ingenuity." It seems difficult to reconcile this with Mr Fletcher's avowed principles and the general tenor of his conduct.

Fletcher.

Fletcher,
Fletewood.

duſt. May we ſuppoſe, that chagrin, if not at the neglect or the ill treatment which he had himſelf received from government ſince the Revolution, yet at the public meaſures relating to his native country, might have occaſioned him to relent in his ſentiments with regard to the exiled family!—In the family-memoirs already quoted, we are informed, That “Lord Marſchal held Mr Fletcher’s character in high admiration;” and that, “when governor of Neuchatel, where Rouſſeau reſided about the year 1766, he prevailed with this very extraordinary genius to write the life of a man whoſe character and actions he wiſhed to have tranſmitted to poſterity with advantage. For this purpoſe, his lordſhip applied to an honourable relation of Mr Fletcher’s for materials, which by him were tranſmitted to lord Marſchal: but the deſign failed through Rouſſeau’s deſultory and capricious diſpoſition.” This anecdote muſt appear incompatible with the known loyalty and attachments of the Earl Marſchal, unleſs we ſuppoſe him to have been privy to ſome ſuch ſentiments of Mr Fletcher as thoſe alluded to by Mr Lockhart: for how could we ſuppoſe him anxious to promote a compoſition, in which the taſk would be to celebrate principles diametrically oppoſite to his own, and to applaud actions ſubverſive of that royal family in whoſe cauſe he had ventured his life, and forfeited his fortune, and foregone his country!—But however theſe circumſtances may be reconciled,—as the integrity, diſintereſtedneſs, and public ſpirit of Mr Fletcher, have been univerſally acknowledged, there is reaſon to believe, that all his ſentiments and actions were founded in honour, and that he never once purſued a meaſure further than he judged it to be for the intereſt of his country.

Mr Fletcher was maſter of the Engliſh, Latin, Greek, French, and Italian languages; and well verſed in hiſtory, the civil law, and all kinds of learning. In his travels, he had not only acquired conſiderable knowledge in the art of war, but alſo became verſant in the reſpective intereſts of the ſeveral princes and ſtates of Europe. In private life, he was affable to his friends, and free from all manner of vice. He had a penetrating, clear, and lively, apprehenſion; but is ſaid to have been too much wedded to opinions, and impatient of contradiction.—He poſſeſſed an uncommon elevation of mind, accompanied with a warmth of temper, which would ſuffer him to brook from no rank among men, nor in any place, an indignity. Of this he exhibited a ſingular proof in the Scots parliament. The earl of Stair, ſecretary of ſtate and miniſter for Scotland, having in the heat of debate uſed an improper expreſſion againſt Mr Fletcher, he ſeized him by his robe, and inſiſted upon public and immediate ſatisfaction. His Lordſhip was obliged inſtantly to beg his pardon in preſence of parliament.

Mr Fletcher was by far the fineſt ſpeaker in the parliament of Scotland: the earl of Stair alone rivalled him. The latter was famed for a ſplendid, the former for a cloſe and nervous, eloquence. He formed his ſtyle on the models of antiquity; and the ſmall volume of his works, Sir John Dalrymple obſerves, tho’ imperfeſtly collected, is one of the very few claſſical compoſitions in the Engliſh language.

FLETEWOOD (William), an eminent Engliſh lawyer and recorder of London, in the reign of queen
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Elizabeth. He was very zealous in ſuppreſſing maſſ-houſes, and committing Popiſh prieſts: but once ruſhing in upon maſſ at the Portugueſe ambaffador’s houſe, he was committed to the Fleet for breach of privilege, but ſoon releaſed. Mr Wood ſays, “He was a learned man, and a good antiquary, but of a marvellous merr-y and pleaſant conceit.” He was a good popular ſpeaker, and wrote well upon ſubjects of government. His principal works are, 1. *Annalium tam regum Edwardi V. Richardi III. & Henrici VII. quam Henrici VIII.* 2. A Table of the Reports of Edmund Plowden. 3. The Office of a Juſtice of Peace. He died about the year 1593.

FLEVILLEA, in botany: A genus of the hexandria order, belonging to the diœcia claſs of plants. The male calyx and corolla are quinquefid; the ſtamina five; the nectarium five converging filaments. The female calyx is quinquefid; there are three ſtyli; fruit an hard trilocular barky apple.

FLEURI (Claude), one of the beſt French critics and hiſtorians of his age, was born at Paris in 1640. He applied himſelf to the law, was made advocate for the parliament of Paris, and attended the bar nine years; he then entered into orders, and was made preceptor to the princes of Conti. In 1689, the king made him ſub-preceptor to the dukes of Burgundy, Anjou, and Berry; and in 1706, when the education of theſe young princes was completed, the king gave him the priory of Argenteville belonging to the Benedictines in the dioceſe of Paris. In 1716, he was choſen counſellor to Louis XV. and died in 1723. He was the author of a great number of eſteemed French works; the principal of which are, 1. An eccleſiaſtical hiſtory, in 20 volumes, the laſt of which ends with the year 1414. 2. The manners of the Iſraelites and Chriſtians. 3. Inſtitutions of eccleſiaſtical law. 4. An hiſtorical catechiſm. 5. On the choice and method of ſtudy. 6. The duties of maſters and ſervants, &c.

FLEURI (Andrew Hercules de), biſhop of Frejus, preceptor to Louis XV. grand almoner to the queen, cardinal and miniſter of ſtate, was born in 1653, and died in 1743. He was an able negociator; and diſtinguiſhed himſelf during his miniſtry by his probity, his zeal for the happineſs of his country, and his pacific diſpoſition.

FLEXIBLE, in phyſics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXOR, in anatomy, a name applied to ſeveral muſcles, which are ſo called from their office, which is to bend the parts to which they belong; in oppoſition to the *extenſors*, which open or ſtretch them. See ANATOMY, *Table of the Muſcles*.

FLIGHT, the act of a bird in flying; or the manner, duration, &c. thereof.

Almoſt every kind of bird has its particular flight: the eagle’s flight is the higheſt; the flight of the ſparrow-hawk and vulture is noble, and fit for high enterprize and combat. The flight of ſome birds is low, weak, and tranſient; the flight of the partridge and pheafant is but of ſhort continuance; that of the dove is laboured; that of the ſparrow undulatory, &c.

The augurs pretended to foretel future events from the flight of birds. See AUGURY.

FLIGHT. In melting the lead-ore in the works at
P p Mendip,

Flevillea
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Flight.

Flint.

Mendip, there is a substance which flies away in the smoke, which they call the flight. They find it sweetish upon their lips, if their faces happen to be in the way of the smoke, which they avoid as much as possible. This, falling on the grass, kills cattle that feed thereon; and, being gathered, and carried home, kills rats and mice in their houses; that which falls on the sand, they gather, and melt upon a slag-hearth into shot and sheet-lead.

FLINT, in natural history, a kind of semitransparent or quite opaque stones; generally of a roundish form, and covered with white crust; of a smooth, uniform, shining texture; so hard, that they will strike fire with steel; calcinable by fire, after which they become white, friable, and, according to Henckel, heavier than before, and soluble by acids; vitrifiable only by the very violent heat of the largest speculums, such as that of Villette, and not even by the focus of one of Tschirnhausen's lenses, according to an experiment of Neumann. They are found generally in beds of chalk and of sand; but never forming entire strata of rock as jasper does. By long exposure to air and the sun, they seem to decay, to lose their lustre, their firmness of texture, and to be changed to a white calcareous earth or chalk. Hence they are almost always found covered with a white chalky crust. They are also convertible into a calcareous earth by fusion, or vitrification with so much fixed alkali that they shall resolve into a liquid mass called the *liquamen* or *oil of flints*, and by precipitation from the fixed alkali by means of acids. See CHEMISTRY, n° 1069.

This genus of stones, or siliceous earths, Cronstedt considers as of an intermediate nature between the quartz and jasper; both of which it so nearly resembles, that it is difficult to distinguish them. Our author characterises it in the following manner: 1. It is more uniformly solid and not so much cracked in the mass as quartz, but more pellucid than the jasper. 2. It bears the air better than the jasper, but worse than the quartz. 3. For the purpose of glass-making it is better than jasper, but not quite so good as quartz. 4. Whenever it has had an opportunity of shooting into crystals, those of quartz are always found in it; as if the quartz made one of its constituent parts, and had been squeezed out of it. This may be seen in every hollow flint and its clefts, which are always filled up with quartz. 5. It often shows most evident marks of having been originally in a soft and slimy tough state like jelly.—To these properties the following are added by other authors. 7. When broken, it is scaly, generally unequal, and cracks into thin lamellæ. 8. In a calcining heat it becomes opaque, white, and milky.

Breaking of FLINTS. The art of cutting, or rather breaking, flint stones into uniform figures, is by some supposed to be one of the arts now lost. That it was known formerly, appears from the ancient Bridewell at Norwich, from the gate of the Augustin friars at Canterbury, that of St John's Abbey at Colchester, and the gate near Whitehall, Westminster. But that the art is not lost, and that the French know it, appears from the platform on the top of the royal observatory at Paris; which, instead of being leaded, is paved with flint cut or broken into regular figures. But we know not that this art hath been any where described.

FLINTS, in the glass trade. The way of preparing

flints for the nicest operations in the glass-trade is this. Choose the hardest flints, such as are black and will resist the file, and will grow white when calcined in the fire. Cleanse these of the white crust that adheres to them, then calcine them in a strong fire, and throw them while red-hot into cold water; wash off the ashes that may adhere to them, and powder them in an iron mortar, and sift them through a very fine sieve; pour upon this powder some weak aquafortis, or the phlegm of aquafortis, to dissolve and take up any particles of iron it may have got from the mortar; stir this mixture several times, then let it rest, and in the morning pour off the liquor, and wash the powder several times with hot water, and afterwards dry it for use. You will thus have a powder for making the purest glass as perfectly fine and faultless as if you had used rock-crystal itself.

The washing off the ferrugineous particles with aquafortis is not necessary when the glass intended to be made is to be tinged with iron afterwards; but when meant to be a pure white, this is the method that will secure success.

FLINT, the chief town of Flintshire, in North Wales. It is commodiously seated on the river Dee; and is but a small place, though it sends one member to parliament. It was formerly noted for its castle, where Richard II. took shelter on his arrival from Ireland; but having quitted it, he was taken prisoner by the duke of Lancaster. The castle now is in a ruinous condition. This castle stands close to the sea on a rock, which in various parts forms several feet of its foundation. It covers about three quarters of an acre. The assizes are still held in the town. It is 195 miles north-west of London.

FLINTSHIRE, a county of Wales, bounded on the north-east and east by an arm of the sea, which is properly the mouth of the river Dee; on the north-west by the Irish Sea; and on the south-south-west and west by Denbighshire. It is the least of all the counties in Wales, being but 33 miles in length and 9 in breadth. It is divided into five hundreds; in which are two market-towns and 28 parishes, with 32,400 inhabitants. The greatest part of this county lies in the diocese of St Asaph, and the rest belongs to that of Chester. It sends two members to parliament, one for the county and one for Flint; and pays one part of the land-tax. The air is cold, but healthful. It is full of hills, intermixed with a few valleys, which are very fruitful, producing some wheat and plenty of rye. The cows, though small, yield a great quantity of milk in proportion to their size, and are excellent beef. The mountains are well stored with lead, coal, and mill-stones. This county also produces good butter, cheese, and honey; of which last the natives make meathelin, a wholesome liquor much used in these parts.

FLIP, a sort of sailors drink, made of malt liquor, brandy, and fugar, mixed.

FLOAT, a certain quantity of timber bound together with rafters athwart, and put into a river to be conveyed down the stream; and even sometimes to carry burdens down a river with the stream.

Float-Boards, those boards fixed to water-wheels of under-shot-mills, serving to receive the impulse of the stream, whereby the wheel is carried round. See the articles WHEEL and MILL.

Flint
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Float

Floats
||
Floor.

It is no advantage to have too great a number of float-boards; because, when they are all struck by the water in the best manner that it can be brought to come against them, the sum of all the impulses will be but equal to the impulse made against one float-board at right angles, by all the water coming out of the penstock through the opening, so as to take place on the float-board. The best rule in this case is, to have just so many, that each of them may come out of the water as soon as possible, after it has received and acted with its full impulse. As to the length of the float-board, it may be regulated according to the breadth of the mill. See the article *MILL*.

FLOATS for Fishing. See *FISHING-FLOATS*.

FLOATAGES, all things floating on the surface of the sea or any water: a word much used in the commissions of water-bailiffs.

FLOATING-Bridge. See *BRIDGE*.

FLOCK-Paper. See *PAPER*.

FLOOD, a deluge or inundation of waters. See *DELUGE*.

FLOOD is also used in speaking of the tide. When the water is at lowest, it is called *flood*; when rising, *young*, or *old flood*; when at highest, *high flood*; when beginning to fall, *ebb-water*.

FLOOD-mark, the mark which the sea makes on the shore at flowing water and the highest tide: it is also called *high-water mark*.

FLOOK of an anchor. See *ANCHOR*.

FLOOKING, among miners, a term used to express a peculiarity in the load of a mine. The load or quantity of ore is frequently intercepted in its course by the crossing of a vein of earth or stone, or some different metallic substance; in which case the load is moved to one side, and this transient part of the land is called a *flookings*.

FLOOR, in building, the underside of a room, or that part we walk on.

Floors are of several sorts; some of earth, some of brick, others of stone, others of boards, &c.

For brick and stone *FLOORS*, see *PAVEMENT*.

For boarded *FLOORS*, it is observable, that the carpenters never floor their rooms with boards till the carcass is set up, and also inclosed with walls, lest the weather should injure the flooring. Yet they generally rough-plane their boards for the flooring before they begin any thing else about the building, that they may set them by to dry and season, which is done in the most careful manner. The best wood for flooring is the fine yellow deal well seasoned, which, when well laid, will keep its colour for a long while; whereas the white sort becomes black by often washing, and looks very bad. The joints of the boards are commonly made plain, so as to touch each other only; but, when the stuff is not quite dry, and the boards shrink, the water runs through them whenever the floor is washed, and injures the ceiling underneath. For this reason they are made with feather edges, so as to cover each other about half an inch, and sometimes they are made with grooves and tenons; and sometimes the joints are made with dove-tails; in which case the lower edge is nailed down and the next dove into it, so that the nails are concealed. The manner of measuring floors is by squares of 16 feet on each side, so that taking the length and breadth and multiplying

them together and cutting off two decimals, the content of a floor in square will be given. Thus 18 by 16 gives 288 or 2 squares and 88 decimal parts.

Earthen-Floors, are commonly made of loam, and sometimes, especially to make malt on, of lime, and brook-sand, and gun-dust, or anvil-dust from the forge.

Ox-blood and fine clay, tempered together, Sir Hugh Plat says, make the finest floor in the world.

The manner of making earthen floors for plain country habitations is as follows: Take two thirds of lime, and one of coal-ashes well sifted, with a small quantity of loam clay; mix the whole together, and temper it well with water, making it up into a heap: let it lie a week or ten days and then temper it over again. After this, heap it up for three or four days, and repeat the tempering very high, till it become smooth, yielding, tough, and gluey. The ground being then levelled, lay the floor therewith about 2½ or 3 inches thick, making it smooth with a trowel: the hotter the season is, the better; and when it is thoroughly dried, it will make the best floor for houses, especially malt-houses.

If any one would have their floors look better, let them take lime made of rag-stones, well tempered with whites of eggs, covering the floor about half an inch thick with it, before the under flooring is too dry. If this be well done, and thoroughly dried, it will look when rubbed with a little oil as transparent as metal or glass. In elegant houses, floors of this nature are made of stucco, or of plaster of Paris beaten and sifted, and mixed with other ingredients.

FLOOR of a ship, strictly taken, is only so much of her bottom as she rests on when aground.

Such ships as have long, and withal broad floors, lie on the ground with most security, and are not apt to heel, or tilt on one side; whereas others, which are narrow in the floor, or, in the sea-phrases, *cranked by the ground*, cannot be grounded without danger of being overturned.

FLOOR-Timbers, in a ship, are those parts of a ship's timbers which are placed immediately across the keel, and upon which the bottom of the ship is framed; to these the upper parts of the timbers are united, being only a continuation of floor-timbers upwards.

FLORA, the reputed goddess of flowers, was, according to Lactantius, only a lady of pleasure, who having gained large sums of money by prostituting herself, made the Roman people her heir, on condition that certain games called *Floralia* might be annually celebrated on her birth-day. Some time afterwards, however, such a foundation appearing unworthy the majesty of the Roman people, the senate, to ennoble the ceremony, converted Flora into a goddess, whom they supposed to preside over flowers; and so made it a part of religion to render her propitious, that it might be well with their gardens, vineyards, &c. But Vossius (*de Idolol.* lib. i. c. 12.) can by no means allow the goddess Flora to have been the courtesan above mentioned: he will rather have her a Sabine deity, and thinks her worship might have commenced under Romulus. His reason is, that Varro, in his fourth book of the Latin tongue, ranks Flora among the deities to whom Tatius king of the Sabines offered up vows before he joined battle with the Romans. Add, that from another passage in Varro it

Floor,
Flora.

Florales
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Florence.

appears, that there were priests of Flora, with sacrifices, &c. as early as the times of Romulus and Numa. The goddess Flora was, according to the poets, the wife of Zephyrus. Her image in the temple of Castor and Pollux was dressed in a close habit, and she held in her hands the flowers of pease and beans: but the modern poets and painters have been more lavish in setting off her charms, considering that no parts of nature offered such innocent and exquisite entertainment to the sight and smell, as the beautiful variety which adorns, and the odour which embalms, the floral creation.

FLORALES LUDI, or FLORAL GAMES, in antiquity, were games held in honour of Flora, the goddess of flowers.—They were celebrated with shameful debaucheries. The most licentious discourses were not enough, but the courtesans were called together by the sound of a trumpet, made their appearance naked, and entertained the people with indecent shows and postures: the comedians appeared after the same manner on the stage. Val. Maximus relates, that Cato being once present in the theatre on this occasion, the people were ashamed to ask for such immodest representations in his presence; till Cato, apprised of the reservedness and respect with which he inspired them, withdrew, that the people might not be disappointed of their accustomed diversion. There were several other sorts of shows exhibited on this occasion; and, if we may believe Suetonius in *Galba*, c. vi. and Vopiscus in *Carinus*, these princes presented elephants dancing on ropes on these occasions.

The ludi florales, according to Pliny, lib. xviii. c. 29. were instituted by order of an oracle of the Sibyls, on the 28th of April; not in the year of Rome 10XVI. as we commonly read it in the ancient editions of that author; nor in 10XIV. as F. Hardouin has corrected it, but, as Vossius reads it, in 513. Though they were not regularly held every year till after 580. They were chiefly held in the night-time, in the Patrician street: some will have it there was a circus for the purpose on the hill called Hortulorum.

FLORALIA, in antiquity, a general name for the feasts, games, and other ceremonies, held in honour of the goddess Flora. See FLORA and FLORALES Ludi.

FLORENCE, the capital of the duchy of Tuscany, and one of the finest cities in Italy. It is surrounded on all sides but one with high hills, which rise insensibly, and at last join with the lofty mountains called the *Apennines*. Towards Pisa, there is a vast plain of 40 miles in length; which is so filled with villages and pleasure-houses, that they seem to be a continuation of the suburbs of the city. Independent of the churches and palaces of Florence, most of which are very magnificent, the architecture of the houses in general is in a good taste; and the streets are remarkably clean, and paved with large broad stones chiseled so as to prevent the horses from sliding. The city is divided into two unequal parts by the river Arno, over which there are no less than four bridges in sight of each other. That called the *Ponte della Trinità*, which is uncommonly elegant, is built entirely of white marble, and ornamented with four beautiful statues representing the Seasons. The quays, the buildings on each side, and the bridges, render that part of Florence through which the river runs by far the finest. Eve-

ry corner of this beautiful city is full of wonders in the arts of painting, statuary, and architecture. The streets, squares, and fronts of the palaces are adorned with a great number of statues; some of them by the best modern masters, Michael Angelo, Bandinelli, Donatello, Giovanni di Bologna, Benvenuto Cellini, and others. Some of the Florentine merchants formerly were men of vast wealth, and lived in a most magnificent manner. One of them, about the middle of the fifteenth century, built that noble fabric, which, from the name of its founder, is still called the *Palazzo Pitti*. The man was ruined by the prodigious expence of this building, which was immediately purchased by the Medici family, and has continued ever since to be the residence of the sovereigns. The gardens belonging to this palace are on the declivity of an eminence. On the summit there is a kind of fort, called *Belvedere*. From this, and from some of the higher walks, you have a complete view of the city of Florence, and the beauteous vale of Arno, in the middle of which it stands. This palace has been enlarged since it was purchased from the ruined family of Pitti. The furniture is rich and curious, particularly some tables of Florentine work, which are much admired. The most precious ornaments, however, are the paintings. The walls of what is called the *Imperial Chamber*, are painted in fresco, by various painters; the subjects are allegorical, and in honour of Lorenzo of Medicis distinguished by the name of the *Magnificent*. The famous gallery attracts every stranger. One of the most interesting parts of it, in the eyes of many, is the series of Roman emperors, from Julius Cæsar to Galienus, with a considerable number of their empresses, arranged opposite to them. This series is almost complete; but wherever the bust of an emperor is wanting, the place is filled up by that of some other distinguished Roman. The celebrated Venus of Medici, which, take it all in all, is thought to be the standard of taste in female beauty and proportion, stands in a room called the *Tribunal*. The inscription on its base mentions its being made by Cleomenes an Athenian, the son of Apollodorus. It is of white marble, and surrounded by other master-pieces of sculpture, some of which are said to be the works of Praxiteles and other Greek masters. In the same room are many valuable curiosities, besides a collection of admirable pictures by the best masters. There are various other rooms, whose contents are indicated by the names they bear; as, the Cabinet of Arts, of Astronomy, of Natural History, of Medals, of Porcelain, of Antiquities; the Saloon of the Hermaphrodite, so called from a statue which divides the admiration of the amateurs with that in the Borgheze village at Rome, though the excellence of the execution is disgraced by the vileness of the subject; and the Gallery of Portraits, which contains the portraits of the most eminent painters (all executed by themselves) who have flourished in Europe during the three last centuries. Our limits will not admit of a detail of the hundredth part of the curiosities and buildings of Florence. We must not however omit mentioning the chapel of St Lorenzo, as being perhaps the finest and most expensive habitation that ever was reared for the dead; it is encrusted with precious stones, and adorned by the workmanship of the best modern sculptors. Mr Addison remarked, that

Florence. that this chapel advanced so very slowly, that it is not impossible but the family of Medicis may be extinct before their burial-place is finished. This has actually taken place: the Medici family is extinct, and the chapel remains still unfinished.

Florence is a place of some strength, and contains an archbishop's see and an university. The number of inhabitants is calculated at 80,000. They boast of the improvements they have made in the Italian tongue, by means of their *Accademia della Crusca*; and several other academies are now established at Florence. Though the Florentines affect great state, yet their nobility and gentry drive a retail trade in wine, which they sell from their cellar-windows, and sometimes they even hang out a broken flask, as a sign where it may be bought. They deal, besides wine and fruits, in gold and silver stuffs. The Jews are not held in that degree of odium, or subjected to the same humiliating distinctions here, as in most other cities of Europe; and it is said that some of the richest merchants are of that religion.

As to the manners and amusements of the inhabitants, Dr Moore informs us, that "besides the *conversazione* which they have here, as in other towns of Italy, a number of the nobility meet every day at a house called the *Casino*. This society is pretty much on the same footing with the clubs in London. The members are elected by ballot. They meet at no particular hour, but go at any time that is convenient. They play at billiards, cards, and other games, or continue conversing the whole evening, as they think proper. They are served with tea, coffee, lemonade, ices, or what other refreshments they choose; and each person pays for what he calls for. There is one material difference between this and the English clubs, that women as well as men are members. The company of both sexes behave with more frankness and familiarity to strangers, as well as to each other, than is customary in public assemblies in other parts of Italy. The opera is a place where the people of quality pay and receive visits, and converse as freely as at the *Casino* above mentioned. This occasions a continual passing and repassing to and from the boxes, except in those where there is a party of cards formed; it is then looked on as a piece of ill manners to disturb the players. From this it may be guessed, that here, as in some other towns in Italy, little attention is paid to the music by the company in the boxes, except at a new opera, or during some favourite air. But the dancers command a general attention: as soon as they begin, conversation ceases; even the card-players lay down their cards, and fix their eyes on the *ballette*. Yet the excellence of Italian dancing seems to consist in feats of strength, and a kind of jerking agility, more than in graceful movement. There is a continual contest among the performers, who shall spring highest. You see here none of the sprightly alluring gaiety of the French comic dancers, nor of the graceful attitudes and smooth flowing motions of the performers in the serious opera at Paris. It is surprising, that a people of such taste and sensibility as the Italians, should prefer a parcel of athletic jumpers to elegant dancers. On the evenings on which there is no opera, it is usual for the genteel company to drive to a public walk immediately without the city, where they remain till it begins to grow dusky." E. Long. 12. 24. N. Lat. 43. 34.

FLORENCE, an ancient piece of English gold-coin. **Florentia** Every pound-weight of standard-gold was to be coined into 50 Florences to be current at six shillings each; all which made in tale 15 pounds; or into a proportionate number of half-Florences or quarter-pieces, by indenture of the mint: 18 Edw. III. **Florida.**

FLORENTIA (anc. geog.), a town of Etruria, on the Arnus; of great note in Sylla's wars. Now called *Florenza* or *Firenza* by the Italians; *Florence* in English. E. Long. 11. Lat. 43. 30.

FLORENTINE MARBLE. See **CITADANESCA**.

FLORESCENTIA (from *floresco*, "to flourish or bloom"); the act of flowering, which Linnæus and the sexualists compare to the act of generation in animals; as the ripening of the fruit in their opinion resembles the birth. See **FLOWER**.

FLORID STYLE, is that too much enriched with figures and flowers of rhetoric.

FLORIDA, the most southerly province of the British empire in America before the last war, bounded on the south by the Gulf of Mexico, on the north by the Apalachian mountains, on the east by the province of Georgia, and on the west by the river Mississippi. It was first discovered, in 1497, by Sebastian Cabot, a Venetian, then in the English service; whence a right to the country was claimed by the kings of England; and this province, as well as Georgia, were included in the charter granted by Charles II. to Carolina. In 1512, however, Florida was more fully discovered by Ponce de Leon, an able Spanish navigator, but who undertook his voyage from the most absurd motives that can be well imagined.—The Indians of the Caribbee islands had among them a tradition, that somewhere on the continent there was a fountain whose waters had the property of restoring youth to all old men who tasted them. The romantic imaginations of the Spaniards were delighted with this idea. Many embarked in voyages to find out this imaginary fountain, who were never afterwards heard of. Their superstitious countrymen never imagined that these people had perished. They concluded that they did not return, only because they had drunk of the immortalizing liquor, and had discovered a spot so delightful, that they did not choose to leave it.—Ponce de Leon set out with this extravagant view as well as others, and fully persuaded of the existence of a third world, the conquest of which was to immortalize his name. In the attempt to discover this country, he rediscovered Florida; but returned to the place from whence he came, visibly more advanced in years than when he set out.—For some time this country was neglected by the Spaniards, and some Frenchmen settled in it. But the new colony being neglected by the ministry, and Philip II. of Spain having accustomed himself to think that he was the sole proprietor of America, fitted out a fleet at Cadiz to destroy them. His orders were executed with barbarity. The French entrenchments were forced, and most of the people killed. The prisoners were hanged on trees; with this inscription, "Not as Frenchmen, but as Heretics."

This cruelty was soon after revenged by Dominic de Gourgues, a skilful and intrepid seaman of Gascony, an enemy to the Spaniards, and passionately fond of hazardous expeditions and of glory. He sold his estate; built some ships; and with a select band of adventurers

like

Florile-
gium
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Floriniani.

like himself, embarked for Florida. He drove the Spaniards from all their posts with incredible valour and activity; defeated them in every rencounter; and, by way of retaliation, hung the prisoners on trees, with this inscription, "Not as Spaniards, but as Assassins." This expedition was attended with no other consequences: Gourgues blew up the forts he had taken, and returned home, where no notice was taken of him. It was conquered in 1539, by the Spaniards under Ferdinand de Soto, not without a great deal of bloodshed; as the natives were very warlike, and made a vigorous resistance. The settlement, however, was not fully established till the year 1665; when the town of St Augustine, the capital of the colony while it remained in the hands of the Spaniards, was founded. In 1586, this place was taken and pillaged by Sir Francis Drake. It met with the same fate in 1665, being taken and plundered by Captain Davis and a body of buccaneers. In 1702, an attempt was made upon it by Colonel More, governor of Carolina. He set out with 500 English and 700 Indians; and having reached St Augustine, he besieged it for three months; at the expiration of which, the Spaniards having sent some ships to the relief of the place, he was obliged to retire. In 1740, another attempt was made by General Oglethorpe: but he being outwitted by the Spanish governor, was forced to raise the siege with loss; and Florida continued in the hands of the Spaniards till the year 1763, when it was ceded by treaty to Great Britain.—During the last war it was again reduced by his Catholic majesty, and was guaranteed to the crown of Spain at the peace.

FLORILEGIUM, FLORILEGE, a name the Latins have given to what the Greeks call *ανθολογιον*, *anthology*; viz. a collection of choice pieces, containing the finest and brightest things in their kind.

FLORILEGE is also particularly used for a kind of breviary, in the Eastern church, compiled by Arcadius, for the convenience of the Greek priests and monks, who cannot carry with them, in their travels and pilgrimages, all the volumes wherein their office is dispersed. The florilegium contains the general rubrics, psalter, canticles, the horologium, and the office of the feria, &c.

FLORIN, is sometimes used for a coin, and sometimes for a money of account.

Florin, as a coin, is of different values, according to the different metals and different countries where it is struck. The gold florins are most of them of a very coarse alloy, some of them not exceeding thirteen or fourteen carats, and none of them seventeen and a half. See *MONEY-Table*.

Florin, as a money of account, is used by the Italian, Dutch, and German merchants and bankers, but admits of different divisions in different places. *Ibid*.

FLORINIANI, or FLORIANI, a sect of heretics, of the second century, denominated from its author Florinus, or Florianus, a priest of the Roman church, deposed along with Blasius for his errors. Florinus had been a disciple of St Polycarp, along with Irenæus. He made God the author of evil; or rather asserted, that the things forbidden by God are not evil, but of his own appointing. In which he followed the errors of Valentinus, and joined himself with the Carpocratians. They had also other names given them. Phi-

lastrius says, they were the same with the *Carpophorians*. He adds, that they were also called *soldiers*, *milities*, *quia de militaribus fuerunt*. St Irenæus calls them *Gnostics*; St Epiphanius, *Phibionites*; and Theodoret, *Borborites*, on account of the impurities of their lives. Others call them *Zaccheans*; others *Coddians*, &c. though for what particular reason, it is not easy to say, nor perhaps would it be worth while to inquire.

FLORIS (Francis), an eminent historical painter, was born at Antwerp in 1520. He followed the profession of a statuary till he was twenty years of age; when preferring painting, he entered the school of Lambert Lombard, whose manner he imitated very perfectly. He afterwards went to Italy, and completed his studies from the most eminent masters. The great progress he made in historical painting, at his return procured him much employment; and his countrymen complimented him with the flattering appellation of *the Flemish Raphael*. He got much money, and might have rendered his acquaintance more worthy of the attention of the great, had he not debased himself by frequent drunkenness. He died 1570, aged 50.

FLORIST, a person curious or skilled in flowers; their kinds, names, characters, culture, &c. It is also applied to an author who writes what is called the flora of any particular place, that is, a catalogue of the plants and trees which are found spontaneously growing there.

FLORUS (Lucius Annæus), a Latin historian, of the same family with Seneca and Lucan. He flourished in the reigns of Trajan and Adrian; and wrote an Abridgment of the Roman History, of which there have been many editions. It is composed in a florid and poetical style; and is rather a panegyric on many of the great actions of the Romans, than a faithful and correct recital of their history. He also wrote poetry, and entered the lists against the emperor Adrian, who satirically reproached him with frequenting taverns and places of dissipation.

FLORY, FLOWRY, or *Fleury*, in heraldry, a cross that has the flowers at the end circumflex and turning down; differing from the *potence*, in as much as the latter stretches out more like that which is called *patee*.

FLOS, FLOWER, in botany. See FLOWER.

Famineus Flos, a flower which is furnished with the pointal or female organs of generation, but wants the stamina or male organ. Female flowers may be produced apart from the male, either on the same root or on distinct plants. Birch and mulberry are examples of the first case; willow and poplar of the second.

Masculus Flos, a male flower. By this name Linnæus and the sexualists distinguish a flower which contains the stamen, reckoned by the sexualists the male organ of generation; but not the stigma or female organ. All the plants of the class diœcia of Linnæus have male and female flowers upon different roots: those of the class monœcia bear flowers of different sexes on the same root. The plants, therefore, of the former are only male and female: those of the latter are androgynous; that is, contain a mixture of both male and female flowers.

FLOS, in chemistry, the most subtle part of bodies separated from the more gross parts by sublimation in a dry form.

FLOTA, or FLOTTA, *fleet*; a name the Spaniards give

Floris
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Flota.

Flotson
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Flour.

give particularly to the ships which they send annually from Cadiz to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. It consists of the captains, admiral, and patach, or pinance, which go on the king's account; and about 16 ships, from 400 to 1000 tons, belonging to particular persons. They set out from Cadiz about the month of August, and are 18 or 20 months before they return. Those sent to fetch the commodities prepared in Peru are called *galleons*.

The name *flotilla* is given to a number of ships, which get before the rest in their return, and give information of the departure and cargo of the *flota* and *galleons*.

FLOTSON, or FLOTSOM, goods that by shipwreck are lost, and floating upon the sea; which, with jetson and lagan, are generally given to the lord admiral: but this is the case only where the owners of such goods are not known. And here it is to be observed, that *jetson* signifies any thing that is cast out of a ship when in danger, and afterwards is beat on the shore by the water, notwithstanding which the ship perishes. *Lagan* is where heavy goods are thrown overboard, before the wreck of the ship, and sink to the bottom of the sea.

FLOUNDER, FLUKE, or *But*, in ichthyology. See PLEURONECTES.

Flounders may be fished for all day long, either in a swift stream, or in the still deep water; but best in the stream, in the months of April, May, June, and July: the most proper baits are all sorts of worms, wafers, and gentles.

FLOUR, the meal of wheat-corn, finely ground and sifted. See MEAL.

The grain itself is not only subject to be eaten by insects in that state; but, when ground into flour, it gives birth to another race of destroyers, who eat it unmercifully, and increase so fast in it, that it is not long before they wholly destroy the substance. The finest flour is most liable to breed these, especially when stale or ill prepared. In this case, if it be examined in a good light, it will be observed to be in continual motion, and on a nicer inspection there will be found in it a great number of little animals of the colour of the flour, and very nimble. If a little of this flour is laid on the plate of the double microscope, the insects are very distinctly seen in great numbers, very brisk and lively, continually crawling over one another's backs, and playing a thousand antic tricks together; whether in diversion, or in search of food, is not easy to be determined. These animals are of an oblong and slender form; their heads are furnished with a kind of trunk or hollow tube, by means of which they take in their food, and their body is composed of several rings. They do vast mischief among magazines of flour laid up for armies and other public uses. When they have once taken possession of a parcel of this valuable commodity, it is impossible to drive them out; and they increase so fast, that the only method of preventing the total loss of the parcel is to make it up into bread as soon as can be done. The way to prevent their breeding in the flour is to preserve it from damp: nothing gets more injury by being put up in damp than flour; and yet nothing is more frequently put up so. It should be always care-

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fully and thoroughly dried before it is put up; and the barrels also dried into which it is to be put; then, if they are placed in a room tolerably warm and dry, they will keep it well. Too dry a place never does flour any hurt, though one too moist almost always spoils it.

Flour, when carefully analysed, is found to be composed of three very different substances. The first and most abundant is pure *starch*, or white fecule, insoluble in cold but soluble in hot water, and of the nature of mucous substances; which, when dissolved, form water-glues. The second is the *gluten*, most of whose properties have been described under the article BREAD. The third is of a mild nature, perfectly soluble in cold water, of the nature of *saccharine* extractive mucous matters. It is susceptible of the spirituous fermentation, and is found but in small quantity in the flour of wheat. See BREAD, GLUTEN, STARCH, and SUGAR.

FLOWER, FLOS, among botanists and gardeners, the most beautiful part of trees and plants, containing the organs or parts of fructification. See BOTANY, p. 427—429, and explanation of Plate CIII. in p. 439. col. 1. See also p. 441, col. 1.

Flowers, designed for medicinal use, should be plucked when they are moderately blown, and on a clear day before noon: for conserves, roses must be taken in the bud.

FLOWERS, in antiquity. We find flowers in great request at the entertainments of the ancients, being provided by the master of the feast, and brought in before the second course; or, as some are of opinion, at the beginning of the entertainment. They not only adorned their heads, necks, and breasts, with flowers, but often bestrewed the beds whereon they lay, and all parts of the room with them. But the head was chiefly regarded. See GARLAND.

Flowers were likewise used in the bedecking of tombs. See BURIAL.

Eternal FLOWER. See XERANTHEMUM.

Everlasting FLOWER. See GNAPHALIUM.

FLOWER-Fence. See POINCIANA.

Sun-FLOWER. See HELIANTHUS.

Sultan-FLOWER. See CYANUS.

Trumpet-FLOWER. See BIGNONIA.

Wind-FLOWER. See ANEMONE.

FLOWER-de-lis, or Flower-de-luce, in heraldry, a bearing representing the lily, called the *queen of flowers*, and the true hieroglyphic of royal majesty; but of late it is become more common, being borne in some coats-one, in others three, in others five, and in some *semee* or spread all over the escutcheon in great numbers.

The arms of France are, three flower-de-lis or, in a field azure.

FLOWER-de-Luce. See IRIS.

FLOWERS, in heraldry. They are much used in coats of arms; and in general signify hope, or denote human frailty and momentary prosperity.

FLOWERS, in chemistry. By this name are generally understood bodies reduced into very fine parts, either spontaneously, or by some operation of art; but the term is chiefly applied to volatile solid substances, reduced into very fine parts, or into a kind of meal by sublimation.—Some flowers are nothing else than the bodies themselves, which are sublimed entire, without suffering

Flower.

Flowers. suffering any alteration or decomposition; and other flowers are some of the constituent parts of the body subjected to sublimation.

Colours of FLOWERS. See the article *COLOUR (of Plants)*.

Colours extracted from FLOWERS. See *COLOUR-Making*, n° 35, 40.

Preserving of FLOWERS. The method of preserving flowers in their natural beauty through the whole year has been much sought after by many people. Some have attempted it by gathering them when dry and not too much opened, and burying them in dry sand; but this, though it preserves their figure well, takes off from the liveliness of their colour. Muntingius prefers the following method to all others. Gather roses, or other flowers, when they are not yet thoroughly open, in the middle of a dry day: put them into a good earthen vessel glazed within; fill the vessel up to the top with them; and when full sprinkle them over with some good French wine, with a little salt in it; then set them by in a cellar, tying down the mouth of the pot. After this they may be taken out at pleasure; and, on setting them in the sun, or within reach of the fire, they will open as if growing naturally; and not only the colour, but the smell also will be preserved.

The flowers of plants are by much the most difficult parts of them to preserve in any tolerable degree of perfection; of which we have instances in all the collections of dried plants, or *herbaria siccata*. In these the leaves, stalks, roots, and seeds of the plants appear very well preserved; the strong texture of these parts making them always retain their natural form, and the colours in many species naturally remaining. But where these fade, the plant is little the worse for use as to the knowing the species by it. But it is very much otherwise in regard to flowers: these are naturally by much the most beautiful parts of the plants to which they belong; but they are so much injured in the common way of drying, that they not only lose, but change their colours one into another, by which means they give a handle to many errors; and they usually also wither up, so as to lose their very form and natural shape. The primrose and cowslip kinds are very eminent instances of the change of colours in the flowers of dried specimens: for those of this class of plants easily dry in their natural shape; but they lose their yellow, and, instead of it, acquire a fine green colour, much superior to that of the leaves in their most perfect state. The flowers of all the violet kind lose their beautiful blue, and become of a dead white: so that in dried specimens there is no difference between the blue-flowered violet and the white-flowered kinds.

Sir Robert Southwell has communicated to the world a method of drying plants, by which this defect is proposed to be in a great measure remedied, and all flowers preserved in their natural shape, and many in their natural colours.—For this purpose two plates of iron are to be prepared of the size of a large half-sheet of paper, or larger, for particular occasions: these plates must be made so thick as not to be apt to bend; and there must be a hole made near every corner for the receiving a screw to fasten them close together. When these plates are prepared, lay in readiness several sheets of paper, and then gather the plants with

N° 128.

Flowers. their flowers when they are quite perfect. Let this be always done in the middle of a dry day; and then lay the plant and its flower on one of the sheets of paper doubled in half, spreading out all the leaves and petals as nicely as possible. If the stalk is thick, it must be pared or cut in half, so that it may lie flat; and if it is woody, it may be peeled, and only the bark left. When the plant is thus expanded, lay round about it some loose leaves and petals of the flower, which may serve to complete any part that is deficient. When all is thus prepared, lay several sheets of paper over the plant, and as many under it; then put the whole between the iron plates, laying the papers smoothly on one, and laying the other evenly over them: screw them close, and put them into an oven after the bread is drawn, and let them lie there two hours. After that, make a mixture of equal parts of aquafortis and common brandy; shake these well together, and when the flowers are taken out of the pressure of the plates, rub them lightly over with a camel's-hair pencil dipped in this liquor; then lay them upon fresh brown paper, and covering them with some other sheets, press them between this and other papers with a handkerchief till the wet of these liquors is dried wholly away. When the plant is thus far prepared, take the bulk of a nutmeg of gum-dragon; put this into a pint of fair water cold, and let it stand 24 hours; it will in this time be wholly dissolved: then dip a fine hair-pencil in this liquor, and with it daub over the back sides of the leaves, and lay them carefully down on a half-sheet of white paper fairly expanded, and press them down with some more papers over these. When the gum-water is fixed, let the pressure and papers be removed, and the whole work is finished. The leaves retain their verdure in this case, and the flowers usually keep their natural colours. Some care, however, must be taken, that the heat of the oven be not too great. When the flowers are thick and bulky, some art may be used to pare off their backs, and dispose the petals in a due order; and after this, if any of them are wanting, their places may be supplied with some of the supernumerary ones dried on purpose; and if any of them are only faded, it will be prudent to take them away, and lay down others in their stead: the leaves may be also disposed and mended in the same manner.

Another method of preserving both flowers and fruit found throughout the whole year is also given by the same author. Take saltpetre one pound; armenian bole, two pounds; clean common sand, three pounds. Mix all well together; then gather fruit of any kind that is not fully ripe, with the stalk to each; put these in, one by one, into a wide-mouthed glass, laying them in good order. Tie over the top with an oil-cloth, and carry them into a dry cellar, and set the whole upon a bed of the prepared matter of four inches thick in a box. Fill up the remainder of the box with the same preparation; and let it be four inches thick all over the top of the glass, and all round its sides. Flowers are to be preserved in the same sort of glasses, and in the same manner; and they may be taken up after a whole year as plump and fair as when they were buried.

FLOWERS (artificial) of the Chinese. See TONG-TSAO.

FLOWERS,

Flowers, Flowering. FLOWERS, in chemistry, are the finest and most subtle parts of dry bodies, raised by fire, into the vessel's head and aludels; and adhering to them in form of a fine powder or dust. Such are the flowers of sulphur, benjamin, &c.

FLOWERS, in the animal economy, denote womens monthly purgations or menses.—Nicod derives the word in this sense from *fluere*, q. d. *fluors*. Others will have the name occasioned hence, that women do not conceive till they have had their flowers; so that these are a sort of forerunners of their fruit.

FLOWERS, in rhetoric, are figures or ornaments of discourse, by the Latins called *flosculi*.

FLOWERING of Bulbous PLANTS. These plants will grow and flower in water alone, without any earth, and make a very elegant appearance. We daily see this practised in single roots; but there is a method of doing it with several roots in the same vessel. Take a common small garden-pot; stop the hole at the bottom with a cork, and lute in the cork with putty, that no water can get through; then fit a board to the top of the pot, and bore six or seven holes in it at equal distances, to place the bulbs in; and as many smaller ones near them to receive sticks, which will serve to tie up the flowers. Then fill up the pot with water to the board; and place tulips, jonquils, narcissus's, and the like plants in the root upon the holes, so that the bottom of the roots may touch the water: thus will they all flower early in the season, and be much more beautiful than any pot of gathered flowers, and will last many weeks in their full perfection. After the season of flowering is over, the roots will gradually shrink through the holes of the board, and get loose into the water: but, instead of being spoiled there, they will soon increase in size; so that they cannot return through the holes, and will produce several off-sets. It is natural to try from this the consequence of keeping the roots under water during the whole time of their blowing; and in this way they have been found to succeed very well, and flower even stronger and more beautifully than when in the ground. They may thus, also, with proper care in the degree of heat in the room, be kept flowering from before Christmas till March or April. It is not easy, in this last manner, to manage the keeping the boards under water, for which reason, it is better to procure some sheet-lead of about four pounds to the foot, and cut this to the size of the mouth of the pot. In this there should be bored holes for the bulbs, and other holes for the sticks: and, in order to keep the sticks quite firm, it is proper to have another plate of lead shaped to the bottom of the pot, with holes in it, answering to those of the upper plate made for the sticks. The sticks will by this means be always kept perfectly steady; and the roots, being kept under water by the upper plate of lead, will flower in the most vigorous and beautiful manner imaginable.—Some have thought of adding to the virtues of the water by putting in nitre in small quantities, and others have added earth and sand at the bottom; but it has always been found to succeed better without any addition.

It may be more agreeable to some to use glass-jars in this last method with the leads, instead of earthen pots. The bulbs succeed full as well as these; and there is this advantage, that the progress of the roots

is seen all the while, and they are managed better as to the supply of water.

By repeated experiments in this way on dried bulbs, and on those taken fresh out of the ground, the former have been found to succeed the best. For those taken fresh out of the ground being full of moisture, will not so soon, upon changing their element, be nourished fully by a new one; and the fibres which they had struck in the ground, always rot when put into the water, and new ones must be formed in their places; so that it requires more time for them to come to flowering. The bulbs themselves will not rot in this manner; but they will never be so strong as those which were put into the water dry, which gradually fill themselves with moisture from it, and regularly plump up. The best method of managing the whole process is this: Place the bulbs at first only on the surface of the water; for thus they will strike out their fibres most strongly. When they have stood thus six weeks, pour in the water so high as to cover them entirely, and keep them thus till they have done flowering.

Sometimes the roots will become mouldy in several parts while they stand above the water, and the cleaning them of it is to no purpose; for it will eat and spread the farther, and frequently eat through two or three of their coats. In this case they must be immediately covered with water; when the mould will be stopped, and the roots become sound, and flower as well as those which never had any such distemper. If the roots are suffered to remain in water all the year, they will not decay; but will flower again at their proper season, and that as vigorously as those which have been taken out and dried. The old fibres of those roots never rot till they are ready to push forth new ones. It is found by experience, that the hyacinth, and many other plants, grow to a greater degree of perfection when thus in water than when in the ground. There is a peculiar species of hyacinth called *Keyser's jewel*; this never, or very rarely, produces seed-vessels in the common way of flowering in the ground; but it will often produce some pods when blown in water.

Mr Millar has intimated, in the Philosophical Transactions, that bulbs set in glasses grow weaker, and should be renewed every other year: but it is found, that, when managed in this manner, and kept under water, at the time of taking them up, they are as large, and some of them larger, than when planted; and if these be dried at a proper season, they will flower, year after year, as well as fresh ones.

Ranunculus and anemone roots have been found to shoot up their stalks very well in this way; but the flowers are usually blasted, which seems to arise from want of free air. Pinks will flower very well in this manner; auriculas also may, with care, be brought to flower, but not strongly. Roses, jessamines, and honeysuckles, may also be made to flower this way, and will thrive and send out suckers; the best pieces to plant, are suckers cut off about three inches under ground, without any fibres. The succulent plants may also be raised this way; for instance, the opuntia or Indian fig. If a fragment of a leaf of this plant be cut, and laid by to dry for a month till it is an absolute skin, as soon as it is put in this manner into water, it be-

Flowering. gins to plump up, and soon sends out fibrous roots, and produces new leaves as quickly as it would do in the ground.

This is the more singular in these sort of plants, because in their natural state in the ground, they cannot bear much water. This method of growing in water is not peculiar to the bulbous-rooted ones, but others may even be raised from seed by it. A bean or pea, set in this manner, will grow up to its proper standard, and will flower and produce pods which will ripen their seed. The smaller seeds may be also raised in this manner, by the help of wool to support them.

No vegetable transplanted out of the earth into water will thrive kindly; but any plant, whether raised from the root or seed in water, may be transplanted to the earth, and will succeed very well. It may be possible, therefore, from this method of raising plants in water, to come at a better way than is usually practised of raising some roots in the earth which are subject to rot there; such as anemones, ranunculus's, and hyacinths. A bulb dropped by chance upon the ground, will strike out both stronger and more numerous fibres than those which are planted in the usual way in the ground. On this principle, it may be proper to take out the earth of the bed where the bulbs are to stand at the time of planting them, to such a depth as they are to be placed under it when set for flowering. The bulbs are then to be set in their places, on the surface of this low ground; and to stand there till they have shot out their fibres and their head: then the earth is to be added over them by degrees, till they are covered as high above the head as they are in the usual manner of planting them: thus they would be preserved from the danger of rotting; and their fibres would be much stronger, and consequently they would draw more nourishment, and flower better, than in the common way. The common method of planting these roots renders them liable to be destroyed by either extreme of a wet or a dry season. In the first case, they immediately rot by the abundant moisture they receive; and, in the second, they become dry as a stick, and mouldy; so that they are infallibly rotted by the first rain that falls afterwards.

The directions necessary to the success of the bulbs planted in water are these. When the leaden false bottoms are fixed down tight within two or three inches of the bottom of the vessel (which is only designed to hold the sticks steady which are to support the leaves and stalks), then lay on the lead upon which the bulbs are to rest, placing the notched part opposite to that in the false bottom, as near as the sticks, when placed, will suffer it; then place the bulbs one in each hole, and fill up with water to the upper lead. The bottom of the bulb will then touch the water; and as the water diminishes in quantity, keep it supplied with more up to the same height for a month or six weeks; in which time the bulbs will have shot strong fibres. Then fill up the water about half an inch above the surface of the lead; and, by degrees, as the fibres strengthen, and the plume shoots from the head, keep the water higher and higher, till at length the whole bulb is covered. The water is to be kept at this standard till the season for drying them returns.—At the time of planting the bulbs, they must

be carefully cleaned from any foulnesses at the bottom, by scraping them with the point of a knife till the sound part of the bulb appears; clear them likewise from any loose skins, and even take off their brown skin till they appear white; otherwise this brown skin will tinge the water, and the growth will not succeed so well.

The notches in the side of each lead are intended to give easy passage to the water, that, if there should be any foulness or sediment in it, on shaking it a little it may all run through, and fresh water be put in its place. But this shifting the water need not be done more than once or twice in a winter, as there may be occasion from the foulness; and when this is done, the sides of the vessel should be cleaned with a painter's brush, and rinsed out again, and the bulbs themselves washed, by pouring water on them at a little distance.

At any time when the outer skins of the bulbs dry, they are to be peeled off, that they may not occasion foulness in the water; and if any dust or foul matter be at any time observed swimming on the surface, the method is to fill up the pot or vessel to the rim, and let it run over: this will carry off that light foulness, and the water may afterwards be poured away to the proper standard.

Bulbs of equal bigness should be planted together in the same pot, that they may all have the same benefit of the water. Narcissus's and hyacinths do well together; as also tulips and jonquils, and crocuses and snow-drops.

FLUDD (Robert), a famous philosopher, born in 1574. He was fellow of the college of physicians in London, and became a most voluminous writer: he doated greatly on the wonders of chemistry; was a zealous brother of the Rosicrucian order; and his books, which are mostly in Latin, are as dark and mysterious in their language as in their matter. He died in 1637.

FLUID, an appellation given to all bodies whose particles easily yield to the least partial pressure, or force impressed. For the

Laws and Properties of FLUIDS. See **HYDROSTATICS.**

There are various kinds of animalcules to be discerned in different fluids by the microscope. Of many remarkable kinds of these, a description is given under the article **ANIMALCULE**. All of these little creatures are easily destroyed by separating them from their natural element. Naturalists have even fallen upon shorter methods. A needle-point, dipped in spirit of vitriol, and then immersed into a drop of pepper-water, readily kills all the animalcules; which, though before frisking about with great liveliness and activity, no sooner come within the influence of the acid particles, than they spread themselves, and tumble down to all appearance dead. The like may be done by a solution of salt; only with this difference, that, by the latter application, they seem to grow vertiginous, turning round and round till they fall down. Tincture of salt of tartar, used in the same manner, kills them still more readily; yet not so, but there will be apparent marks of their being first sick and convulsed. Inks destroy them as fast as spirit of vitriol, and human blood produces the same effect. Urine, sack, and sugar, all destroy them, though not so fast; besides, that there is some

Flowering
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Fluid.

Fluid.

some diversity in their figures and appearances, as they receive their deaths from this poison or that. The point of a pin dipped in spittle, presently killed all the kinds of animalcules in puddle-water, as Mr Harris supposes it will other animalcules of this kind.

All who are acquainted with microscopic observations, know very well, that in winter, in which the best glasses can discover no particle of animated matter, after a few grains of pepper, or a fragment of a plant of almost any kind, has been some time in it, animals full of life and motion are produced; and those in such numbers, as to equal the fluid itself in quantity.—When we see a numerous brood of young fishes in a pond, we make no doubt of their having owed their origin to the spawn, that is, to the eggs of the parents of the same species. What are we then to think of these? If we will consider the progress of nature in the insect tribes in general, and especially in such of them as are most analogous to these, we shall find it less difficult to give an account of their origin than might have been imagined.

A small quantity of water taken from any ditch in the summer-months, is found to be full of little worms, seeming in nothing so much as in size to differ from the microscopic animalcules. Nay, water, without these, exposed in open vessels to the heat of the weather, will be always found to abound with multitudes of them, visible to the naked eye, and full of life and motion. These we know, by their future changes, are the fly-worms of the different species of gnats, and multitudes of other fly-species; and we can easily determine, that they have owed their origin only to the eggs of the parent-fly there deposited. Nay, a closer observation will at any time give ocular proof of this; as the flies may be seen laying their eggs there, and the eggs may be followed through all their changes to the fly again. Why then are we to doubt but that the air abounds with other flies and animalcules as minute as the worms in those fluids; and that these last are only the fly-worms of the former, which, after a proper time spent in that state, will suffer changes like those of the larger kinds, and become flies like those to whose eggs they owed their origin? *Vid. Reaumur. Hist. Insect. vol. iv. p. 431.*

The differently medicated liquors made by infusions of different plants, afford a proper matter for the worms of different species of these small flies: and there is no reason to doubt, but that among these some are viviparous, others oviparous; and to this may be, in a great measure, owing the different time taken up for the production of these insects in different fluids. Those which are a proper matter for the worms of the viviparous fly, may be soonest found full of them; as, probably, the liquor is no sooner in a state to afford them proper nourishment, than their parents place them there; whereas those produced from the eggs of the little oviparous flies, must, after the liquor is in a proper state, and they are deposited in it in the form of eggs, have a proper time to be hatched, before they can appear alive.

It is easy to prove, that the animals we find in these vegetable infusions were brought thither from elsewhere. It is not less easy to prove, that they could not be in the matter-infused any more than in the water in which it is infused.

Fluid.

Notwithstanding the fabulous accounts of salamanders, it is now well known, that no animal, large or small, can bear the force of fire for any considerable time; and, by parity of reason, we are not to believe, that any insect, or embryo insect, in any state, can bear the heat of boiling water for many minutes. To proceed to inquiries on this foundation: If several tubes filled with water, with a small quantity of vegetable matter, such as pepper, oak-bark, truffles, &c. in which, after a time, insects will be discovered by the microscope; and other like tubes be filled with simple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all separately boiled in it; when all these liquors come to a proper time for the observation of the microscope, all, as well those which have been boiled as those which have not, will be found equally to abound with insects; and those of the same kind, in infusions of the same kind, whether boiled or not boiled. Those in the infusions which had sustained a heat capable of destroying animal-life, must therefore not have subsisted either in the water or in the matters put into it, but must have been brought thither after the boiling; and it seems by no way so probably, as by means of some little winged inhabitants of the air depositing their eggs or worms in these fluids.

On this it is natural to ask, how it comes to pass, that while we see myriads of the progeny of these winged insects in water, we never see themselves? The answer is equally easy, viz. because we can always place a drop of this water immediately before the focus of the microscope, and keep it there while we are at leisure to examine its contents; but that is not the case with regard to the air inhabited by the parent flies of these worms, which is an immense extent in proportion to the water proper for nourishing these worms; and, consequently, while the latter are clustered together in heaps, the former may be dispersed and scattered. Nor do we want instances of this, even in insects of a larger kind. In many of our gardens, we frequently find vessels of water filled with worms of the gnat kind, as plentifully, in proportion to their size, as those of other fluids are with animalcules. Every cubic inch of water in these vessels contains many hundreds of animals; yet we see many cubic inches of air in the garden not affording one of the parent flies.

But neither are we positively to declare that the parent flies of these animalcules are in all states wholly invisible to us; if not singly to be seen, there are some strong reasons to imagine that they may in great clusters. Every one has seen in a clear day, when looking steadfastly at the sky, that the air is in many places disturbed by motions and convolutions in certain spots. These cannot be the effects of imagination, or of faults in our eyes, because they appear the same to all; and if we consider what would be the case to an eye formed in such a manner as to see nothing smaller than an ox, on viewing the air on a marsh fully peopled with gnats, we must be sensible, that the clouds of these insects, though to us distinctly enough visible, would appear to such an eye merely as the moving parcels of air in the former instance do to us: and surely it is thence no rash conclusion to infer, that the case may be the same, and that myriads of flying insects,

Fluid,
Fluidity.

fects, too small to be singly the objects of our view, yet are to us what the clouds of gnats would be in the former case.

Nervous FLUID. See ANATOMY, p. 761. col. 2.

Elastic FLUIDS. See AEROLOGY, AIR, *FIXED Air*, GAS, VAPOUR, &c.

FLUIDITY, is by Sir Isaac Newton defined to be, that property of bodies by which they yield to any force impressed, and which have their parts very easily moved among one another.

To this definition some have added, that the parts of a fluid are in a continual motion. This opinion is supported by the solution of salts, and the formation of tinctures. If a small bit of saffron is thrown into a phial full of water, a yellow tincture will soon be communicated to the water to a considerable height, though the phial is allowed to remain at rest; which indicates a motion in those parts of the fluid which touch the saffron, by which its colouring matter is carried up.

With regard to water, this can scarce be denied; the constant exhalations from its surface show, that there must be a perpetual motion in its parts from the ascent of the steam through it. In mercury, where insensible evaporation does not take place, it might be doubted; and accordingly the Newtonian philosophers in general have been of opinion, that there are some substances essentially fluid, from the spherical figure of their constituent particles. The congelation of mercury, however, by an extreme degree of cold*, demonstrates that fluidity is not essentially inherent in mercury more than in other bodies.

That fluids have vacuities in their substance is evident, because they may be made to dissolve certain bodies without sensibly increasing their bulk. For example, water will dissolve a certain quantity of salt; after which it will receive a little sugar, and after that a little alum, without increasing its first dimensions. Here we can scarce suppose any thing else than that the saline particles were interposed between those of the fluid; and as, by the mixture of salt and water, a considerable degree of cold is produced, we may thence easily see why the fluid receives these substances without any increase of bulk. All substances are expanded by heat, and reduced into less dimensions by cold; therefore, if any substance is added to a fluid, which tends to make it cold, the expansion by the bulk of the substance added, will not be so much perceived as if this effect had not happened; and if the quantity added be small, the fluid will contract as much, perhaps more, from the cold produced by the mixture, than it will be expanded from the bulk of the salt. This also may let us know with what these interstices between the particles of the fluid were filled up; namely, the element of fire or heat. The saline particles, upon their solution in the fluid, have occupied these spaces; and now the liquor, being deprived of a quantity of this element equal in bulk to the salt added, feels sensibly colder.

As, therefore, there is scarce any body to be found, but what may become solid by a sufficient degree of cold, and none but what a certain degree of heat will render fluid; the opinion naturally arises, that fire is the cause of fluidity in all bodies, and that this element is the only essentially fluid substance in nature.

Hence we may conclude, that those substances which we call *fluids* are not essentially so, but only assume that appearance in consequence of an intimate union with the element of fire; just as gums assume a fluid appearance on being dissolved in spirit of wine, or salts in water.

Upon these principles Dr Black mentions fluidity as an effect of heat*. The different degrees of heat which are required to bring different bodies into a state of fluidity, he supposes to depend on some particulars in the mixture and composition of the bodies themselves: which becomes extremely probable, from considering that we change the natural state of bodies in this respect, by certain mixtures; thus, if two metals are compounded, the mixture is usually more fusible than either of them separately. See CHEMISTRY, n° 542.

It is certain, however, that water becomes warmer by being converted into ice†; which may seem contradictory to this opinion. To this, however, the Doctor replies, that fluidity does not consist in the degree of sensible heat contained in bodies, which will affect the hand or a thermometer; but in a certain quantity which remains in a latent state‡. This opinion he supports from the great length of time required to melt ice; and to ascertain the degree of heat requisite to keep water in a fluid state, he put five ounces of water into a Florence flask, and converted it into ice by means of a freezing mixture put round the flask. Into another flask of the same kind he put an equal quantity of water cooled down nearly to the freezing point, by mixing it with snow, and then pouring it off. In this he placed a very delicate thermometer; and found, that it acquired heat from the air of the room in which it was placed: seven degrees of heat were gained the first half hour. The ice being exposed to the same degree of heat, namely, the air of a large room without fire, it cannot be doubted that it received heat from the air as fast as the water which was not frozen: but, to prevent all possibility of deception, he put his hand under the flask containing the ice, and found a stream of cold air very sensibly descending from it, even at a considerable distance from the flask; which undeniably proved, that the ice was all that time absorbing heat from the air. Nevertheless, it was not till 11 hours that the ice was half-melted, though in that time it had absorbed so much heat as ought to have raised the thermometer to 140°; and even after it was melted, the temperature of the water was found scarce above the freezing point: so that, as the heat which entered could not be found in the melted ice, he concluded that it remained concealed in the water, as an essential ingredient of its composition. See CONGELATION.

FLUKE, or FLOUNDER, in ichthyology. See PLEURONECTES.

FLUKE-Worm. See FASCIOLA.

FLUKE of an Anchor, that part of it which fastens in the ground. See ANCHOR.

FLUMMERY, a wholesome sort of jelly made of oat-meal.

The manner of preparing it is as follows. Put three large handfuls of finely ground oat-meal to steep, for 24 hours, in two quarts of fair water: then pour off the clear water, and put two quarts of fresh water to it.

Fluidity
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Flummery.

* See Congelation.

* See Chemistry, n° 115, 117, 119.

† See Congelation.

‡ See Evaporation.

Fluor.

it: strain it through a fine hair-sieve, putting in two spoonfuls of orange-flower water and a spoonful of sugar: boil it till it is as thick as a hafty-pudding, stirring it continually while it is boiling, that it may be very smooth.

FLUOR, in physics, a fluid; or, more properly, the state of a body that was before hard or solid, but is now reduced by fusion or fire into a state of fluidity.

FLUOR Acid. See CHEMISTRY-Index.

FLUOR Albus. See MEDICINE-Index.

FLUOR-Spar, or *Blue-John*, called also fluxing spars, vitrescent or glass spars, are a genus of fossils composed of calcareous earth united with an acid of a peculiar kind, of which an account is given under CHEMISTRY; see that article, per Index at *Fluor acid*.

They are little harder than common calcareous spars, and do not strike fire with steel; nor do they effervesce with acids either before, or after calcination. When exposed to a strong fire, they crack and split in pieces, but do not melt without a violent heat. Engeström informs us, that all of them which he tried melted pretty easily before the blow-pipe; but he was obliged to take great care to prevent them from flying away before they were thoroughly heated. Their specific gravity is from 3144 to 3175. Notwithstanding the difficulty with which they are fused by themselves, however, they melt very readily in conjunction with other earths; running into a corrosive glass which dissolves the strongest crucibles, unless some quartz or fire-clay be mixed in their composition. When gradually heated, they give a phosphorescent light; but lose this property when made red-hot. Those which are coloured, particularly the green ones, give the strongest light. They melt easily with borax, and next to that with the microcosmic salt, neither of them making any effervescence. They dissolve in acids when boiling, particularly aqua-regia; and the solutions are precipitated by an alkali even though cold, but not so completely. M. Magellan informs us, that he has frequently dissolved them in boiling vitriolic acid in order to get that of fluor in an aerial state. There are three species.

1. The indurated fluor is solid, and of an indeterminate figure, of a dull texture, semitransparent, and full of cracks in the rock. It is of a white colour.

2. Sparry fluor. This has nearly the figure of spar; though, on close observation, it is found less regular; nothing but its glossy surface giving it the resemblance of spar. It is found of various colours, viz. white, blue, green, pale-green, violet, and yellow.

3. The crystallized fluor is of four kinds. 1. Having an irregular figure, of a white, blue, or red colour. 2. Crystallized in cubes, of a yellow or violet colour. 3. Of a polygonal spherical figure, white or blue coloured. 4. Of an octoedral figure, clear and colourless.

The principal use of fluors is for smelting ores, where they act as very powerful fluxes, and on this account are much valued. They are found in various countries, particularly Sweden, and some other northern countries of Europe. From this quality of melting easily in combination with other earthy matters, they have got the name of *fluors*. "The resemblance between the coloured fluors and the compositions made of coloured glass (says Cronstedt), has perhaps contributed not only to the fluors being

reckoned of the same value with the coloured quartz crystals, by such collectors as only mind colour and figure, but to their also obtaining a rank among the precious stones in the apothecaries and druggists shops."

M. Fabroni observes, that this combination of calcareous earth with the sparry acid is almost always transparent: it often crystallizes in regular cubes, sometimes single from one line to two inches in diameter, and sometimes of an indeterminate figure. They are sometimes of a blue colour; others are purple like amethysts; some are of a brown colour, others opaque. M. Magellan says, that fluors in general have this singular property, that on being melted by the flame of the blow-pipe, together with gypsum, the lead resulting from both is all formed with facets on the outside; but if melted with terra ponderosa, its surface is quite round or spherical.

M. Margraaf has made experiments in order to discover the nature of these stones. He ascertained the above-mentioned distinctions between them and the gypseous spars; and therefore infers, that they are not compounded of vitriolic acid with calcareous earth. He observed singular appearances on mixing them with vitriolic and other acids, and subjecting the mixtures to distillation.

Eight ounces of the powder of a green fluor being mixed with an equal weight of pure oil of vitriol, and distilled together with a graduated heat, yielded, after the watery part of the acid had passed, a fine white sublimate, which arose and adhered to the neck of the retort, and even passed into the receiver. The first parts of this sublimate which arose appeared like butter of antimony; and, like this butter, they melted by the heat of a live coal brought near the neck of the retort: but the parts which arose towards the end of the operation, with the greatest degree of heat, could not be melted by that heat. The retort being broken, a residuum was found weighing 12 oz. Hence 4 oz. of oil of vitriol remained united with the spar. The bottom of the retort was observed to be pierced with holes. Lastly, the liquor which had passed into the receiver and the white sublimate, had very sensibly a sulphureous smell. The sublimate, triturated a long time in a mortar with hot distilled water, dissolved, and passed thro' a filter. To the filtrated liquor some fixed alkali being added, a precipitate was formed; which being well washed and dried, was readily melted by fire into a mass resembling porcelain. The same excellent and accurate chemist produced the same effects upon this stone, by substituting, instead of the vitriolic acid, the nitrous, marine, phosphoric, or the concentrated acetic acids.

FLUOR Albus or Uterinus, in medicine, a kind of flux incident to women, popularly called the *whites*. See MEDICINE-Index.

FLUSHING, an handsome, strong, and considerable town of the United Provinces, in Zealand, and in the island of Walcheren, with a very good harbour, and a great foreign trade. It was put into the hands of queen Elizabeth for a pledge of their fidelity, and as a security for the money she advanced. It is one of the three places which Charles V. advised Philip II. to preserve with care. E. Long. 3. 32. N. Lat. 51. 26.

FLUTE, an instrument of music, the simplest of all those of the wind kind. It is played on by blowing

Fluor
||
Flute.

Flute. it with the mouth; and the tones or notes are changed by stopping and opening the holes disposed for that purpose along its side.

This is a very ancient instrument. It was at first called the flute à bec, from *bec* an old Gaulish word signifying the beak of a bird or fowl, but more especially of a cock; the term *flute à bec* must therefore signify the beaked flute; which appears very proper, on comparing it with the traverse or German flute. The word *flute* is derived from *fluta*, the Latin for a lamprey or small eel taken in the Sicilian seas, having seven holes immediately below the gills on each side, the precise number of those in the front of the flute.

By Merfennus this instrument is called the *ffsula dulcis*, seu *Anglica*; the lowest note, according to him, for the treble flute, is *C fa ut*, and the compass of the instrument 15 notes. There is, however, a flute known by the name of the *concert flute*, the lowest note of which is F. Indeed, ever since the introduction of the flute into concerts, the lowest note of the instrument, of what size soever it is, has been called F; when in truth its pitch is determinable only by its correspondence in respect of acuteness or gravity with one or other of the chords in the *scala maxima* or great system.

Besides the true concert-flute, others of a less size were soon introduced into concerts of violins; in which case the method was to write the flute-part in a key correspondent to its pitch. This practice was introduced in 1710 by one Woodcock, a celebrated performer on this instrument, and William Babell organist of the church of All-hallows, Bread Street, London. They failed, however, in procuring for the flute a reception into concerts of various instruments; for which reason, one Thomas Stanesby, a very curious maker of flutes and other instruments of the like kind, about the year 1732, adverting to the scale of Merfennus, in which the lowest note was C, invented what he called the *new system*; in which, by making the flute of such a size as to be a fifth above concert pitch, the lowest note became *C sol fa ut*. By this contrivance the necessity of transposing the flute-part was taken away; for a flute of this size, adjusted to the system above mentioned, became an octave to the violin. To further this invention of Stanesby, one Lewis Mercie, an excellent performer on the flute, published, about the year 1735, six solos for this instrument, three of which are said to be accommodated to Mr Stanesby's new system; but the German flute was now become a favourite instrument, and Stanesby's ingenuity failed of its effect.—One great objection indeed lies against this instrument, which, however, equally affects all perforated pipes; namely, that they are never perfectly in tune, or cannot be made to play all their notes with equal exactness. The utmost that the makers of them can do is to tune them to some one key; as the hautboy to C, the German flute to D, and the English flute to F; and to effect this truly is a matter of no small difficulty. The English flutes made by the younger Stanesby came the nearest of any to perfection; but those of Bressan, though excellent in their tone, are all too flat in the upper octave. For these reasons some are induced to think, that the utmost degree of proficiency on any of those instruments is not worth the labour of attaining it.

German Flute, is an instrument entirely different from the common flute. It is not, like that, put into the mouth to be played; but the end is stoppt with a tampion or plug, and the lower lip is applied to a hole about two inches and a half or three inches distant from the end. This instrument is usually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, besides that for the mouth, the lowest of which is stopped and opened by the little finger's pressing on a brass or sometimes a silver key, like those in hautboys, bassoons, &c. Its sound is exceeding sweet and agreeable; and serves as a treble in a concert.

FLUTE, or *FLUYT*, is a kind of long vessel, with flat ribs or floor-timbers, round behind, and swelled in the middle; serving chiefly for the carrying of provisions in fleets or squadrons of ships; though it is often used in merchandize. The word *flute*, taken for a sort of boat or vessel, is derived, according to Borel, from the ancient *flotte*, a little boat. In the verbal process of the miracles of St Catherine of Sweden, in the 12th century, we read *Unus equum suum una cum mercibus magni ponderis introduxit super instrumentum de lignis fabricatum, vulgariè dictum fluta*. Upon which the Bollandists observe, that in some copies it is read *flotta*, an instrument called by the Latins *rahis*; and that the word *flutta* or *flotta* arose from *flotten* or *wlotten*, "to float."

FLUTES, or *FLUTINGS*, in architecture, are perpendicular channels or cavities cut along the shaft of a column or pilaster. They are supposed to have been first introduced in imitation of the plaits of womens robes; and are therefore called by the Latins *striges* and *rugæ*. The French call them *cannelures*, as being excavations; and we, *flutes* or *flutings*, as bearing some resemblance to the musical instrument so called. They are chiefly affected in the Ionic order, in which they had their first rise; though they are also used in all the richer orders, as the Corinthian and Composite; but rarely in the Doric, and scarce ever in the Tuscan.

FLUX, in medicine, an extraordinary issue or evacuation of some humour. Fluxes are various and variously denominated according to their seats or the humours thus voided; as a flux of the belly, uterine flux, hepatic flux, salival flux, &c. The flux of the belly is of four kinds, which have each their respective denominations, viz. the *lientery*, or *fluxus lientericus*; the *caliac*, or *fluxus chylosus*; the *diarrhæa*; and the *dysentery*, or *bloody flux*;—all which are properly treated of in *MEDICINE*.

FLUX, in hydrography, a regular periodical motion of the sea, happening twice in 24 hours; wherein the water is raised and driven violently against the shores. The flux or flow is one of the motions of the tide; the other, whereby the water sinks and retires, is called the reflux or ebb. There is also a kind of rest or cessation of about half an hour between the flux and reflux; during which time the water is at its greatest height, called *high-water*. The flux is made by the motion of the water of the sea from the equator towards the poles; which, in its progress, striking against the coasts in its way, and meeting with opposition from them, swells, and where it can find passage, as in flats, rivers, &c. rises up and runs into the land. This motion follows, in some measure, the course of the moon;

Flute
||
Flux.

Flux.

as it loses or comes later every day by about three quarters of an hour, or more precisely, by 48 minutes; and by so much is the motion of the moon slower than that of the sun. It is always highest and greatest in full moons, particularly those of the equinoxes. In some parts, as at Mount St Michael, it rises 80 or 90 feet, though in the open sea it never rises above a foot or two; and in some places, as about the Morea, there is no flux at all. It runs up some rivers above 120 miles. Up the river Thames it only goes 80, viz. near to Kingston in Surry. Above London bridge the water flows four hours and ebbs eight; and below the bridge, flows five hours and ebbs seven.

Flux, in metallurgy, is sometimes used synonymously with *fusion*. For instance, an ore, or other matter, is said to be in liquid flux, when it is completely fused.

But the word *flux* is generally used to signify certain saline matters, which facilitates the fusion of ores, and other matters which are difficultly fusible in essays and reductions of ores. Fixed alkalis, nitre, borax, tartar, and common salt, are the saline matters of which fluxes are generally composed. But the word *flux* is more particularly applied to mixtures of different proportions of only nitre and tartar; and these fluxes are called by particular names, according to the proportions of these ingredients, as in the following articles.

White Flux, is made with equal parts of nitre and of tartar detonated together, by which they are alkali-fied. The residuum of this detonation is an alkali composed of the alkalis of the nitre and of the tartar, both which are absolutely of the same nature. As the proportion of nitre in this mixture is more than is sufficient to consume entirely all the inflammable matter of the tartar, the alkali remaining after the detonation is perfectly white, and is therefore called *white flux*; and as this alkali is made very quickly, it is also called *extemporaneous alkali*. When a small quantity only of white flux is made, as a few ounces for instance, some nitre always remains undecomposed, and a little of the inflammable principle of the tartar, which gives a red or even a black colour to some part of the flux: but this does not happen when a large quantity of white flux is made; because then the heat is much greater. This small quantity of undecomposed nitre and tartar

which remains in white flux is not hurtful in most of the metallic fusions in which this flux is employed: but if the flux be required perfectly pure, it might easily be disengaged from those extraneous matters by a long and strong calcination, without fusion.

Crude Flux. By crude flux is meant the mixture of nitre and tartar in any proportions, without detonation. Thus the mixture of equal parts of the two salts used in the preparation of the white flux, or the mixture of one part of nitre and two parts of tartar for the preparation of the black flux, are each of them a crude flux before detonation. It has also been called *white flux*, from its colour: but this might occasion it to be confounded with the white flux above described. The name, therefore, of crude flux is more convenient.

Crude flux is detonated and alkali-fied during the reductions and fusions in which it is employed; and is then changed into white or black flux, according to the proportions of which it is composed. This detonation produces good effects in these fusions and reductions, if the swelling and extravasation of the detonating matters be guarded against. Accordingly, crude flux may be employed successfully in many operations; as, for instance, in the ordinary operation for procuring the regulus of antimony.

Black Flux. Black flux is produced from the mixture of two parts of tartar and one part of nitre detonated together. As the quantity of nitre which enters into the composition of this flux is not sufficient to consume all the inflammable matter of the tartar, the alkali which remains after the detonation contains much black matter, of the nature of coal, and is therefore called *black flux*.

This flux is designedly so prepared, that it shall contain a certain quantity of inflammable matter; for it is thereby capable, not only of facilitating the fusion of metallic earths like the white flux, but also of reviving these metals by its phlogiston. From this property it is also called *reducing flux*; the black flux, therefore, or crude flux made with such proportions of the ingredients as to be convertible into black flux, ought always to be used when metallic matters are at once to be fused and reduced, or even when destructive metals are to be fused, as these require a continual supply of phlogiston to prevent their calcination.

Flux.

F L U X I O N S;

A METHOD of calculation which greatly facilitates computations in the higher parts of mathematics. Sir Isaac Newton and Mr Leibnitz contended for the honour of inventing it. It is probable they had both made progress in the same discovery, unknown to each other, before there was any publication on the subject.

In this branch of mathematics, magnitudes of every kind are supposed generated by motion; a line by the motion of a point, a surface by the motion of a line, and a solid by the motion of a surface. And some part of a figure is supposed generated by an uniform motion; in consequence of which, the other parts may increase uniformly or with an accelerated or retarded motion, or may decrease in any of these ways; and

the computations are made by tracing the comparative velocities with which the parts flow.

Fig. 1. If the parallelogram ABCD be generated Plane by an uniform motion of the line AB toward CD while CXCW. it moves from FE towards *fe*, while the line BF receives the increment *Ff*, and the figure will be increased by the parallelogram *Ff*; the line FE in this case undergoes no variation.

The fluxion of any magnitude at any point is the increment that it would receive in any given time, supposing it to increase uniformly from that point; and as the measures will be the same, whatever the time be, we are at liberty to suppose it less than any assigned time.

The first letters in the alphabet are used to represent:

sent invariable quantities; the letters x, y, z , variable quantities; and the same letters with points over them $\dot{x}, \dot{y}, \dot{z}$, represent their fluxions.

Therefore if $AB = a$, and $BF = x$; $F\dot{f}$, the fluxion of BF , will be $= \dot{x}$, and $F\dot{e}$, the fluxion of AF , $= a\dot{x}$.

If the rectangle be supposed generated by the uniform motion of FG towards CD , at the same time that HG moves uniformly towards AD , the point G keeping always on the diagonal, the lines FG, HG will flow uniformly; for while Bf receives the increment Ff , and HB the increment HK , FG will receive the increment hg , and HG the increment hg , and they will receive equal increments in equal successive times. But the parallelogram will flow with an accelerated motion; for while F flows to f , and H to K , it is increased by the gnomon KGf ; but while F and H flow through the equal spaces fm, KL , it is increased by the gnomon Lgm greater than KGf ; consequently when fluxions of the sides of a parallelogram are uniform, the fluxion of the parallelogram increases continually.

The fluxion of the parallelogram $BHGF$ is the two parallelograms KG and Gf ; for though the parameter receives an increment of the gnomon KGf , while its sides flow to f and K , the part gG is owing to the additional velocity wherewith the parallelogram flows during that time; and therefore is no part of the measure of the fluxion, which must be computed by supposing the parameter to flow uniformly as it did at the beginning, without any acceleration.

Therefore if the sides of a parallelogram be x and y , their fluxions will be \dot{x} and \dot{y} ; and the fluxion of the parallelogram $xy + y\dot{x}$; and if $x = y$, that is, if the figure be a square, the fluxion of x^2 will be $2x\dot{x}$.

Fig. 2. Let the triangle ABC be described by the uniform motion of DE from A towards B , the point E moving in the line DF , so as always to touch the lines AC, CB ; while D moves from A to F , DE is uniformly increased, and the increase of the triangle is uniformly accelerated. When DE is in the position FC , it is a maximum. As D moves from F to B , the line FC decreases, and the triangle increases, but with a motion uniformly retarded.

Fig. 3. If the semicircle AFB be generated by the uniform motion of CD from A towards B , while C moves from A to G , the line CD will increase, but with a retarded motion; the circumference also increases with a retarded motion, and the circular space increases with an accelerated motion, but not uniformly, the degrees of acceleration growing less as CD approaches to the position GF . When C moves from G to B , it decreases with a motion continually accelerated, the circumference increases with a motion continually retarded, and the area increases with a motion continually retarded, and more quickly retarded as CD approaches to B .

The fluxion of a quantity which decreases is to be considered as negative.

When a quantity does not flow uniformly, its fluxion may be represented by a variable quantity, or a line of a variable length; the fluxion of such a line is called the *second fluxion* of the quantity whose fluxion that line is: and if it be variable, a third fluxion may be deduced from it, and higher orders from these in the same

N^o 128.

manner: the second fluxion is represented by two points, as \ddot{x} .

The increment a quantity receives by flowing for any given time, contains measures of all the different orders of fluxions; for if it increases uniformly, the whole increment is the first fluxion; and it has no second fluxion. If it increases with a motion uniformly accelerated, the part of the increment occasioned by the first motion measures the first fluxion, and the part occasioned by the acceleration measures the second fluxion. If the motion be not only accelerated, but the degree of acceleration continually increased, the two first fluxions are measured as before; and the part of the increment occasioned by the additional degree of acceleration measures the third; and so on. These measures require to be corrected, and are only mentioned here to illustrate the subject.

DIRECT METHOD.

Any flowing quantity being given, to find its fluxion.

RULE I. To find the fluxion of any power of a quantity, multiply the fluxion of the root by the exponent of the power, and the product by a power of the same root less by unity than the given exponent.

The fluxion of x^3 is $3x^2\dot{x}$, of x^n $nx^{n-1}\dot{x}$; for the root of x^n is x , whose fluxion is \dot{x} ; which multiplied by the exponent n , and by a power of x less by unity than n , gives the above fluxion.

If x receive the increment \dot{x} , it becomes $x + \dot{x}$; raise both to the power of n , and x^n becomes $x^n + nx^{n-1}\dot{x} + \frac{n(n-1)}{2}x^{n-2}\dot{x}^2 + \&c.$; but all the parts of the incre-

ment, except the first term, are owing to the accelerated increase of x^n , and form measures of the higher fluxions. The first term only measures the first fluxion; the

fluxion of $a^2 + z^2$ is $\frac{1}{2} \times 2zz \times a^2 + z^2$; for put $x = a^2 + z^2$, we have $\dot{x} = 2z\dot{z}$; and the fluxion of $x^{\frac{1}{2}}$, which is equal to the proposed fluent, is $\frac{1}{2}x^{-\frac{1}{2}}\dot{x}$; for which substituting the values of z and \dot{x} , we have the above fluxion.

RULE II. To find the fluxion of the product of several variable quantities multiplied together, multiply the fluxion of each by the product of the rest of the quantities, and the sum of the products thus arising will be the fluxion sought.

Thus the fluxion of xy , is $x\dot{y} + y\dot{x}$; that of xyz , is $xyz + xz\dot{y} + yz\dot{x}$; and that of $xyzu$, is $xyzu + xyuz + xzuy + yzux$.

RULE III. To find the fluxion of a fraction—From the fluxion of the numerator multiplied by the denominator, subtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the square of the denominator.

Thus, the fluxion of $\frac{x}{y}$ is $\frac{y\dot{x} - x\dot{y}}{y^2}$; that of $\frac{x}{x+y}$, is $\frac{x\dot{x} + xy - x + y\dot{x}}{(x+y)^2} = \frac{y\dot{x} - xy}{(x+y)^2}$.

RULE

RULE IV. In complex cafes, let the particulars be collected from the simple rules, and combined together.

The fluxion of $\frac{x^2 y^2}{z}$ is $\frac{2x^2 y y' + 2y^2 x x' z - x^2 y^2 z'}{z^2}$; for the fluxion of x^2 is $2xx'$, and of y^2 is $2yy'$, by Rule I. and therefore the fluxion of $x^2 y^2$ (by Rule II.) $2x^2 y y' + 2y^2 x x'$; from which multiplied by z , (by Rule III.) and subtracting from it the fluxion of the denominator z , multiplied by the numerator, and dividing the whole by the square of the denominator, gives the above fluxion.

RULE V. The second fluxion is derived from the first, in the same manner as the first from the flowing quantity.

Thus the fluxion of x^3 , $3x^2 x'$; its second, $6xx'' + 3x'^2$ (by Rule II.); and so on: but if x be invariable, $x'=0$, and the second fluxion of $x^3 = 6xx''$.

PROB. I. To determine maxima and minima.

WHEN a quantity increases, its fluxion is positive; when it decreases, it is negative; therefore when it is just betwixt increasing and decreasing, its fluxion is $=0$.

RULE. Find the fluxion, make it $=0$, whence an equation will result that will give an answer to the question.

EXAMP. To determine the dimensions of a cylindric measure ABCD, (fig. 4.) open at the top, which shall contain a given quantity (of liquor, grain, &c.) under the least internal superficies possible.

Let the diameter $AB=x$, and the altitude $AD=y$; moreover, let p (3,14159, &c.) denote the periphery of the circle whose diameter is unity, and let c be the given content of the cylinder. Then it will be $1:p::x:(px)$ the circumference of the base; which, multiplied by the altitude y , gives pxy for the concave superficies of the cylinder. In like manner, the area of the base, by multiplying the same expression into $\frac{1}{4}$ of the diameter x , will be found $=\frac{px^2}{4}$; which drawn

into the altitude y , gives $\frac{px^2 y}{4}$ for the solid content of the cylinder; which being made $=c$, the concave surface pxy will be found $=\frac{4c}{x}$, and consequently the

whole surface $=\frac{4c}{x} + \frac{px^2}{4}$: Whereof the fluxion, which is $-\frac{4cx}{x^2} + \frac{px}{2}$ being put $=0$, we shall get $-8c \times px^3 = 0$;

and therefore $x=2\sqrt[3]{\frac{c}{p}}$ further, because $px^3=8c$,

and $px^2 y = 4c$, it follows, that $x=2y$; whence y is also known, and from which it appears that the diameter of the base must be just double of the altitude.

Fig. 7. To find the longest and shortest ordinates of any curve, DEF, whose equation or the relation which the ordinates bear to the abscissas is known.

Make AC the abscissa x , and CE the ordinate $=y$; take a value y in terms of x , and find its fluxion; which

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making $=0$, an equation will result whose roots give the value of x when y is a maximum or a minimum.

To determine when it is a maximum and when a minimum, take the value of y , when x is a little more than the root of the equation so found, and it may be perceived whether it increases or decreases.

If the equation has an even number of equal roots, y will be neither a maximum nor minimum when its fluxion is $=0$.

PROB. II. To draw a tangent to any curve.

Fig. 5. When the abscissa CS of a curve moves uniformly from A to B, the motion of the curve will be retarded if it be concave, and accelerated if convex towards AB; for a straight line TC is described by an uniform motion, and the fluxion of the curve at any point is the same as the fluxion of the tangent, because it would describe the tangent if it continued to move equally from that point. Now if Ss or Cc be the fluxion of the base, Cd will be the fluxion of the tangent, and de of the ordinate. And because the triangles TSC, Ced, are equiangular, $de:ce::CS:ST$, wherefore,

RULE. Find a fourth proportional to the fluxion of the ordinate valued in terms of the abscissa, the fluxion of the abscissa, and the ordinate, and it determines the line ST, which is called the semi-tangent, and TC joined is a tangent to the curve.

EXAMP. To draw a right line CT, (fig. 6.) to touch a given circle BCA in a point C.

Let CS be perpendicular to the diameter AB, and put $AB=a$, $BS=x$, and $SC=y$; then, by the property of the circle, $y^2 (CS^2) = BS \times AS (=x \times a - x) = ax - x^2$; whereof the fluxion being taken, in order to determine the ratio of x and y , we get $2yy' = ax' - 2xx'$; consequently $\frac{x'}{y} = \frac{2y}{a-2x} = \frac{y}{\frac{1}{2}a-x}$; which multiplied by y , gives $\frac{yx'}{y} = \frac{y^2}{\frac{1}{2}a-x}$ = the subtangent ST. Whence (O being supposed the centre) we have $OS (\frac{1}{2}a-x):CS (y)::CS (y):ST$; which we also know from other principles.

PROB. III. To determine points of contrary flexure in curves.

FIG. 7. Supposing C to move uniformly from A to B, the curve DEF will be convex towards AB when the celerity of E increases, and concave when it decreases; therefore at the point where it ceases to be convex and begins to be concave, or the opposite way, the celerity of E will be uniform, that is, CE will have no second fluxion. Therefore,

RULE. Find the second fluxion of the ordinate in terms of the abscissa, and make it $=0$; and from the equation that arises you get a value of the abscissa, which determines the point of contrary flexure.

Ex. Let the nature of the curve ARS be defined by the equation $ay = a^{\frac{1}{2}} x^{\frac{1}{2}} + xx$, (the abscissa AF and the ordinate FG being, as usual, represented by x and y respectively). Then y , expressing the celerity of the

point r , in the line FH, will be equal to $\frac{\frac{1}{2}a x' x + 2xx'}{a}$:

Whose fluxion, or that of $\frac{1}{2} a^{\frac{1}{2}} x^{-\frac{1}{2}} + 2x$ (because a and R r

and x are constant) must be equal to nothing; that is, $-\frac{1}{4}a^{\frac{1}{2}}x^{-\frac{3}{2}} + 2x = 0$: Whence $a^{\frac{1}{2}}x^{-\frac{3}{2}} = 8$, $a^{\frac{1}{2}} = 8x^{\frac{3}{2}}$, $64x^3 = a^2$, and $x = \frac{1}{4}a = AF$; therefore $FG (= \frac{a^{\frac{1}{2}}x^{\frac{1}{2}} + x^{\frac{3}{2}}}{a}) = \frac{2}{3}a$: From which the position of the point G is given.

PROB. IV. To find the radii of curvature.

THE curvature of a circle is uniform in every point, that of every other curve continually varying: and it is measured at any point by that of a circle whose radius is of such a length as to coincide with it in curvature in that point.

All curves that have the same tangent have the same first fluxion, because the fluxion of a curve and its tangent are the same. If it moved uniformly on from the point of contact, it would describe the tangent. And the deflection from the tangent is owing to the acceleration or retardation of its motion, which is measured by its second fluxion: and consequently two curves which have not only the same tangent, but the same curvature at the point of contact, will have both their first and second fluxions equal. It is easily proven from thence, that the radius of curvature is

$\frac{z^3}{-xy}$, x , y , and z represent the abscissa, ordinate, and curve respectively.

EXAMP. Let the given curve be the common parabola, whose equation is $y = a^{\frac{1}{2}}x^{\frac{1}{2}}$: Then will $y = \frac{1}{2}a^{\frac{1}{2}}x^{-\frac{1}{2}}$, $\frac{a^{\frac{1}{2}}x^{\frac{1}{2}}}{2x^{\frac{1}{2}}}$, and (making x constant) $y'' = -\frac{1}{2} \times \frac{1}{2}a^{\frac{1}{2}}x^{-\frac{3}{2}} = -\frac{a^{\frac{1}{2}}}{4x^{\frac{3}{2}}}$: Whence $z (\sqrt{x^2 + y^2}) = \frac{x}{2} \sqrt{\frac{4x+a}{x}}$, and

the radius of curvature $(\frac{z^3}{-xy}) = \frac{a+4x}{2\sqrt{a}}$: Which at the vertex, where $x=0$, will be $=\frac{1}{2}a$.

INVERSE METHOD.

From a given fluxion to find a fluent.

THIS is done by tracing back the steps of the direct method. The fluxion of x is \dot{x} ; and therefore the fluent of \dot{x} is x : but as there is no direct method of finding fluents, this branch of the art is imperfect. We can assign the fluxion of every fluent; but we cannot assign the fluent of a fluxion, unless it be such a one as may be produced by some rule in the direct method from a known fluent.

GENERAL RULE. Divide by the fluxion of the root, add unity to the exponent of the power, and divide by the exponent so increased.

For, dividing the fluxion $nx^{n-1}\dot{x}$ by \dot{x} (the fluxion of the root x) it becomes nx^{n-1} ; and, adding 1 to the exponent ($n-1$), we have nx^n ; which, divided by n , gives x^n , the true fluent of $nx^{n-1}\dot{x}$.

Hence (by the same rule) the

Fluent of $3x^2\dot{x}$ will be $=x^3$;

That of $8x^{\frac{3}{2}}\dot{x} = \frac{8x^{\frac{5}{2}}}{\frac{5}{2}}$;

That of $2x^5\dot{x} = \frac{x^6}{3}$;

That of $y^{\frac{1}{2}}\dot{y} = \frac{2}{3}y^{\frac{3}{2}}$.

Sometimes the fluent so found requires to be corrected. The fluxion of x is \dot{x} , and the fluxion of $a+x$ is also \dot{x} ; because a is invariable, and has therefore no fluxion.

Now when the fluent of \dot{x} is required, it must be determined, from the nature of the problem, whether any invariable part, as a , must be added to the variable part x .

When fluents cannot be exactly found, they can be approximated by infinite series.

Ex. Let it be required to approximate the fluent of $\frac{a^2 - x^2}{c^2 - x^2} \times \dot{x}$ in an infinite series.

The value of $\frac{a^2 - x^2}{c^2 - x^2}$, expressed in a series, is $\frac{a}{c} +$

$\frac{a}{2c^3} - \frac{1}{2ac} \times x^2 + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times x^4 + \frac{5a}{16c^7} - \frac{3}{16ac} \times x^6 + \&c.$ Which value being therefore multiplied by $x^n \dot{x}$, and the fluent taken (by the common method) we get $\frac{ax^{n+1}}{n+1 \times c} + \frac{a}{2c^3} - \frac{1}{2ac} \times \frac{x^{n+3}}{n+3} + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times \frac{x^{n+5}}{n+5} + \frac{5a}{16c^7} - \frac{3}{16ac^5} - \frac{1}{16a^3c^3} - \frac{1}{16a^5c} \times \frac{x^{n+7}}{n+7} + \&c.$

PROB. I. To find the area of any curve.

RULE. Multiply the ordinate by the fluxion of the abscissa, and the product gives the fluxion of the figure, whose fluent is the area of the figure.

EXAMP. 1. Fig. 8. Let the curve ARMH, whose area you will find, be the common parabola. Let u represent the area, and \dot{u} its fluxion.

In which case the relation of $AB (x)$ and $BR (y)$ being expressed by $y^2 = ax$ (where a is the parameter) we thence get $y = a^{\frac{1}{2}}x^{\frac{1}{2}}$; and therefore $\dot{u} = RmHB (= y\dot{x}) = a^{\frac{1}{2}}x^{\frac{1}{2}}\dot{x}$: whence $u = \frac{2}{3} \times a^{\frac{1}{2}}x^{\frac{3}{2}} = \frac{2}{3}a^{\frac{1}{2}}x^{\frac{3}{2}} \times x = \frac{2}{3}yx$ (because $a^{\frac{1}{2}}x^{\frac{1}{2}} = y$) $= \frac{2}{3} \times AB \times BR$: hence a parabola is $\frac{2}{3}$ of a rectangle of the same base and altitude.

EXAMP. 2. Let the proposed curve CSDR (fig. 9.) be of such a nature, that (supposing AB unity) the sum of the areas CSTBC and CDGBC answering to any two proposed abscissas AT and AG , shall be equal to the area CRNBC, whose corresponding abscissa AN is equal

equal to $AT \times AG$, the product of the measures of the two former abscissas.

First, in order to determine the equation of the curve (which must be known before the area can be found), let the ordinates GD and NR move parallel to themselves towards HF ; and then having put $GD=y$, $NR=z$, $AT=a$, $AG=s$, and $AN=u$, the fluxion of the area $CDGB$ will be represented by ys , and that of the area $CRNB$ by zu : which two expressions must, by the nature of the problem, be equal to each other; because the latter area $CRNB$ exceeds the former $CDGB$ by the area $CSTB$, which is here considered as a constant quantity: and it is evident, that two expressions, that differ only by a constant quantity, must always have equal fluxions.

Since, therefore, $ys = zu$, and $u = as$, by hypothesis, it follows, that $u = as$, and that the first equation (by substituting for u) will become $ys = azt$, or $y = az$, or lastly $ys = zas$, that is, $GD \times AG = NR \times AN$: therefore, $GD : NR :: AN : AG$; whence it appears, that every ordinate of the curve is reciprocally as its corresponding abscissa.

Now, to find the area of the curve so determined, put $AB=1$, $BC=b$, and $BG=x$: then, since $AG(1+x) : AB(1) :: BC(b) : GD(y)$ we have $y = \frac{b}{1+x}$,

consequently $\dot{u} (=y\dot{x}) = \frac{b\dot{x}}{1+x} = b \times \dot{x} - x\dot{x} + x^2\dot{x} - n^2\dot{x} + x\dot{x}^2 - \&c.$ Whence, $BGDC$, the area itself will be $= b \times x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5}$, &c. which was to be found.

Hence it appears, that as these areas have the same properties as logarithms, this series gives an easy method of computing logarithms; and the fluent may be found by means of a table of logarithms, without the trouble of an infinite series: and every fluxion whose fluent agrees with any known logarithmic expression, may be found the same way. Hence the fluents of fluxions of the following forms are deduced.

The fluent of $\frac{\dot{x}}{\sqrt{x^2 \pm a^2}} = \text{hyp. log. of } x + \sqrt{x^2 \pm a^2}$;

of $\frac{\dot{x}}{\sqrt{2ax \pm x^2}} = \text{hyp. log. of } a \times x + \sqrt{2ax \pm x^2}$;

of $\frac{2ax}{a^2 - x^2} = \text{hyp. log. of } \frac{a+x}{a-x}$;

and of $\frac{2ax}{x\sqrt{a^2 \pm x^2}} = \text{hyp. log. of } \frac{a - \sqrt{a^2 \pm x^2}}{a + \sqrt{a^2 \pm x^2}}$

PROB. 2. To determine the length of curves.

Fig. 5. Because Cde is a right-angle triangle, $Cd^2 = Ce^2 + de^2$; wherefore the fluxions of the abscissa and ordinate being taken in the same terms and squared, their sum gives the square of the fluxion of the curve; whose root being extracted, and the fluent taken, gives the length of the curve.

EXAMP. To find the length of a circle from its tangent. Make the radius AO (fig. 5.) $=a$, the tangent of $AC=t$, and its secant $=s$, the curve $=z$, and its

fluxion $=\dot{z}$; because the triangles OTC , OCS , are similar, $OT : OC :: OC :: OS$; whence $OS = \frac{a^2}{s}$, and $SA = a - \frac{a^2}{s} = a - \frac{a^2}{\sqrt{a^2 + t^2}}$; whose

fluxion is $\frac{a^2 \dot{t}}{a^2 + t^2}$; and because the triangles OTC , dCe are similar, $TC (=t) : TO (= \sqrt{a^2 + t^2}) :: Ce$

$= \left(\frac{a^2 \dot{t}}{a^2 + t^2} \right) : Cd = \frac{a^2 \dot{t}}{a^2 + t^2} = \text{fluxion of the curve.}$

Now by converting this into an infinite series we have the

fluxion of the curve $= \dot{t} - \frac{t^2 \dot{t}}{a^2} + \frac{t^4 \dot{t}}{a^4} - \frac{t^6 \dot{t}}{a^6}$, &c. and con-

sequently $z = -\frac{t^3}{3a^2} + \frac{t^5}{5a^4} - \frac{t^7}{7a^6} + \frac{t^9}{9a^8}$, &c. $= AR$.

Where, if (for example's sake) AR be supposed an arch of 30 degrees, and AO (to render the operation more easy) be put $=$ unity, we shall have $t = \sqrt{\frac{1}{3}} = .5773502$ (because $Ob \sqrt{\frac{1}{3}} : tR (\frac{1}{2}) :: OA(1) : AT(t) = \sqrt{\frac{1}{3}}$). Whence,

$$t^3 (=t \times t^2 = t \times \frac{1}{3}) = .1924500$$

$$t^5 (=t^3 \times t^2 = \frac{t^3}{3}) = .0641500$$

$$t^7 (=t^5 \times t^2 = \frac{t^5}{3}) = .0213833$$

$$t^9 (=t^7 \times t^2 = \frac{t^7}{3}) = .0071277$$

$$t^{11} (=t^9 \times t^2 = \frac{t^9}{3}) = .0023759$$

$$t^{13} (=t^{11} \times t^2 = \frac{t^{11}}{3}) = .0007919$$

$$t^{15} (=t^{13} \times t^2 = \frac{t^{13}}{3}) = .0002639$$

&c.

And therefore $AR = .5773502 - \frac{.1924500}{3} + \frac{.0641500}{5} - \frac{.0213833}{7} + \frac{.0091277}{9} - \frac{.0023759}{11} + \frac{.0007919}{13} - \frac{.0002639}{15} + \frac{.0000879}{17} - \frac{.0000293}{19} + \frac{.0000097}{21} - \frac{.0000032}{23} = .5235987$: for the length of

an arch of 30 degrees, which multiplied by 6 gives $3.141592+$ for the length of the semi-periphery of the circle whose radius is unity.

Other series may be deduced from the versed sine and secant; and these are of use for finding fluents which cannot be expressed in finite terms.

$\left\{ \begin{array}{l} \frac{w}{\sqrt{2aw - w^2}} \\ \frac{w}{\sqrt{a^2 - w^2}} \\ \frac{aw}{a^2 + w^2} \\ \frac{aw}{w\sqrt{w^2 - a^2}} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{Versed sine} \\ \text{Right sine} \\ \text{Tangent} \\ \text{Secant} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{is } \frac{w}{a}, \text{ and} \\ \text{Radius Unity.} \end{array} \right\}$
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R r 2

PROB.

PROB. 3. To find the contents of a solid.

LET the surface of the generating plane be multiplied by the space it passes through in any time, the product will give a solid which is the fluxion of the solid required: the surface must therefore be computed in terms of x , which represents the line or axis on which it moves, and by its motion on which the fluxion is to be measured, and the fluent found will give the contents of the solid.

EXAMP. Let it be proposed to find the content of a cone ABC, fig. 10.

Put the given altitude (AD) of the cone $=a$, and the semidiameter (BD) of its base $=b$, the solid $=s$, its fluxion $=\dot{s}$, and the area of a circle, whose radius is unity, $=p$: then the distance (AF) of the circle EG, from the vertex A, being denoted by x , we have, by similar triangles, as $a : b :: x : EF (y)$ $=\frac{bx}{a}$. Whence in this case, $\dot{s} (=p\dot{y}x) = \frac{pb^2x^2}{a^2}$;

and consequently $s = \frac{pb^2x^3}{3a^2}$; which, when $x=a (=AD)$

gives $\frac{pb^2a}{3} (=p \times BD^2 \times \frac{1}{3} AD)$ for the content of the whole cone ABC: which appears from hence to be just $\frac{1}{3}$ of a cylinder of the same base and altitude.

PROB. 4. To compute the surface of any solid body.

THE fluxion of the surface of the solid is equal to the periphery of the surface, by whose motion the so-

lid is generated, multiplied by its velocity on the edge of the solid, and the computation is made as in the foregoing.

EXAMP. Let it be proposed to determine the convex superficies of a cone ABC, fig. 11.

Then, the semidiameter of the base (BD or CD) being put $=b$, the slanting line or hypothenuse $AC=c$, and FH (parallel to DC) $=y$, $AG=z$, the surface $=w$, its fluxion $=\dot{w}$, and p the periphery of a circle whose diameter is unity, we shall, from the similarity of the triangles ADC and Hmb, have $b : c :: y$ $(mb : x (Hb) = \frac{cy}{b})$: whence $\dot{w} (2py\dot{x}) = \frac{2pcy\dot{y}}{b}$; and

consequently $w = \frac{pcy^2}{b}$. This, when $y=b$, becomes $=pcb = p \times DC \times AC =$ the convex superficies of the whole cone ABC: which therefore is equal to a rectangle under half the circumference of the base and the slanting line.

The method of fluxions is also applied to find the centres of gravities, and oscillation of different bodies; to determine the paths described by projectiles and bodies acted on by central forces, with the laws of centripetal force in different curves, the retardates given to motions performed in resisting medii, the attractions of bodies under different forms, the direction of wind which has the greatest effect on an engine, and to solve many other curious and useful problems.

F L Y

Fly.

FLY, in zoology, a large order of insects, the distinguishing characteristic of which is, that their wings are transparent. By this they are distinguished from beetles, butterflies, grasshoppers, &c.

Flies are subdivided into those which have four, and those which have two wings.

Of those with four wings there are several genera or kinds; as the ant, apis, ichneumon, &c. See APIS, FORMICA, &c.

Of those with two wings, there are likewise several kinds, as the gad-fly, gnat, &c. See GAD-FLY, &c.

Those who desire a more particular account of the anatomy, generation, structure, and manifold subdivisions of flies, may consult Reaumer's History of Insects, tom. 4. See also ENTOMOLOGY.

House-FLY. See MUSCA.

Pestilential FLY. See ETHIOPIA, n° 11.

FLY, in mechanics, a cross with leaden weights at its ends; or rather, a heavy wheel at right angles, to the axis of a windlass, jack, or the like; by means of which, the force of the power, whatever it is, is not only preserved, but equally distributed in all parts of the revolution of the machine. See MECHANICS.

FLIES for Fishing. See FISHING-FLY.

Vegetable FLY, a very curious natural production chiefly found in the West Indies. "Excepting that it has no wings, it resembles the drone both in size and colour more than any other British insect. In the month of May it buries itself in the earth, and begins to vegetate. By the latter end of July, the tree

F L Y

Fly.

is arrived at its full growth, and resembles a coral branch; and is about three inches high, and bears several little pods, which dropping off become worms, and from thence flies, like the British caterpillar."

Such was the account originally given of this extraordinary production. But several boxes of these for 1763, flies having been sent to Dr Hill for examination, his report was this: "There is in Martinique a fungus of the clavaria kind, different in species from those hitherto known. It produces soboles from its sides; I call it therefore *clavaria sobolifera*. It grows on putrid animal bodies, as our *fungus ex pede equino* from the dead horse's hoof. The cicada is common in Martinique, and in its nymph state, in which the old authors call it *tettigometra*: it buries itself under dead leaves to wait its change; and when the season is unfavourable, many perish. The seeds of the clavaria find a proper bed on this dead insect, and grow. The *tettigometra* is among the cicadæ in the British museum; the clavaria is just now known. This is the fact, and all the fact; though the untaught inhabitants suppose a fly to vegetate, and though there is a Spanish drawing of the plants growing into a trifoliate tree, and it has been figured with the creature flying with this tree upon its back."

The ingenious Mr Edwards has taken notice of this extraordinary production in his Gleanings of Natural History, from which the figures on Plate CXCVI. are taken.

FLY-Boat, or Flight, a large flat-bottomed Dutch vessel,

Fly,
Flyers.

vessel, whose burden is generally from 600 to 1200 tons. It is distinguished by a stern remarkably high, resembling a Gothic turret, and by very broad buttocks below.

Fly-Catcher, in zoology. See *MUSCICAPA*.

Fly-Trap, in botany, a newly discovered sensitive plant. See *DIONÆA Muscipula*.

Fly-Tree, in natural history, a name given by the common people of America to a tree, whose leaves, they say, at a certain time of the year produce flies. On examining these leaves about the middle of summer, the time at which the flies use to be produced, there are found on them a sort of bags of a tough matter, of about the size of a filbert, and of a dusky greenish colour. On opening one of these bags with a knife, there is usually found a single full-grown fly, of the gnat kind, and a number of small worms, which in a day or two more have wings and flee away in the form of their parent. The tree is of the mulberry kind, and its leaves are usually very largely stocked with these insect-bags; and the generality of them are found to contain the insects in their worm-state; when they become winged, they soon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rumple the leaf or injure its shape. They are of the kind of leaf-galls, and partake in all respects, except size, of a species we have frequent on the large maple, or, as it is called, the *sycomore*.

FLYERS, in architecture, such stairs as go straight, and do not wind round, nor have the steps made tapering; but the fore and back part of each stair and the ends respectively parallel to one another. So that if one flight do not carry you to your designed height, there is a broad half space; and then you fly again, with steps every where of the same breadth and length as before.

FLYERS, the performers in a celebrated exhibition among the Mexicans, which was made on certain great festivals, and is thus described by Clavigero in his History of that people. "They sought in the woods for an extremely lofty tree, which, after stripping it of its branches and bark, they brought to the city, and fixed in the centre of some large square. They cased the point of the tree in a wooden cylinder, which, on account of some resemblance in its shape, the Spaniards called a *mortar*. From this cylinder hung four strong ropes, which served to support a square frame. In the space between the cylinder and the frame, they fixed four other thick ropes, which they twisted as many times round the tree as there were revolutions to be made by the flyers. These ropes were drawn through four holes, made in the middle of the four planks of which the frame consisted. The four principal flyers, disguised like eagles, herons, and other birds, mounted the tree with great agility, by means of a rope which was laced about it from the ground up to the frame; from the frame they mounted one at a time successively upon the cylinder, and after having danced there a little, they tied themselves round with the ends of the ropes, which were drawn through the holes of the frame, and launching with a spring from it, began their flight with their wings expanded. The action of their bodies put the frame and the cylinder in motion; the frame

by its revolutions gradually untwisted the cords by which the flyers swung; so that as the ropes lengthened, they made so much the greater circles in their flight. Whilst these four were flying, a fifth danced upon the cylinder, beating a little drum, or waving a flag, without the smallest apprehension of the danger he was in of being precipitated from such a height. The others who were upon the frame (there having been 10 or 12 persons generally who mounted), as soon as they saw the flyers in their last revolution, precipitated themselves by the same ropes, in order to reach the ground at the same time amidst the acclamations of the populace. Those who precipitated themselves in this manner by the ropes, that they might make a still greater display of their agility, frequently passed from one rope to another, at that part where, on account of the little distance between them, it was possible for them to do so. The most essential point of this performance consisted in proportioning so justly the height of the tree with the length of the ropes, that the flyers should reach the ground with 13 revolutions, to represent by such number their century of 52 years, composed in the manner we have already mentioned. This celebrated diversion is still in use in that kingdom; but no particular attention is paid to the number of the revolutions or the flyers; as the frame is commonly hexagonal or octagonal, and the flyers 6 or 8 in number. In some places they put a rail round the frame, to prevent accidents which were frequent after the conquest; as the Indians became much given to drinking, and used to mount the tree when intoxicated with wine or brandy, and were unable to keep their station on so great a height, which was usually 60 feet." See Plate CXCVI.

FLYING, the progressive motion of a bird, or other winged animal, in the air.

The parts of birds chiefly concerned in flying are the wings and tail: by the first, the bird sustains and wafts himself along; and by the second, he is assisted in ascending and descending; to keep his body poised and upright, and to obviate the vacillations thereof.

It is by the largeness and strength of the pectoral muscles, that birds are so well disposed for quick, strong, and continued flying. These muscles, which in men are scarce a 70th part of the muscles of the body in birds, exceed and outweigh all the other muscles taken together; upon which Mr Willoughby makes this reflection, that if it be possible for man to fly, his wings must be so contrived and adapted, that he may make use of his legs, and not his arms, in managing them.

The tail, Messrs Willoughby, Ray, and many others, imagine to be principally employed in steering and turning the body in the air, as a rudder: but Borelli has put it beyond all doubt, that this is the least use of it, which is chiefly to assist the bird in its ascent and descent in the air, and to obviate the vacillations of the body and wings: for, as to turning to this or that side, it is performed by the wings and inclination of the body, and but very little by the help of the tail. The flying of a bird, in effect, is quite a different thing from the rowing of a vessel. Birds do not vibrate their wings towards the tail, as oars are struck towards the stern,

Flying.

Flying.

stem, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water; but is disposed horizontally, and preserves the same situation what way soever the bird turns. In effect, as a vessel is turned about on its centre of gravity to the right, by a brisk application of the oars to the left; so a bird, in beating the air with its right wing alone, towards the tail, will turn its fore-part to the left. Thus pigeons changing their course to the left, would labour it with their right wing, keeping the other almost at rest. Birds of a long neck alter their course by the inclination of their head and neck; which altering the course of gravity, the bird will proceed in a new direction.

The manner of FLYING is thus: The bird first bends his legs, and springs with a violent leap from the ground; then opens and expands the joints of his wings, so as to make a right line perpendicular to the sides of his body: thus the wings, with all the feathers therein, constitute one continued lamina. Being now raised a little above the horizon, and vibrating the wings with great force and velocity perpendicularly against the subject air, that fluid resists those successions, both from its natural inactivity and elasticity, by means of which the whole body of the bird is protruded. The resistance the air makes to the withdrawing of the wings, and consequently the progress of the bird, will be so much the greater, as the waft or stroke of the fan of the wing is longer: but as the force of the wing is continually diminished by this resistance, when the two forces continue to be in *equilibrio*, the bird will remain suspended in the same place; for the bird only ascends so long as the arch of air the wing describes makes a resistance equal to the excess of the specific gravity of the bird above the air. If the air, therefore, be so rare as to give way with the same velocity as it is struck withal, there will be no resistance, and consequently the bird can never mount. Birds never fly upwards in a perpendicular line, but always in a parabola. In a direct ascent, the natural and artificial tendency would oppose and destroy each other, so that the progress would be very slow. In a direct descent they would aid one another, so that the fall would be too precipitate.

Artificial FLYING, that attempted by men, by the assistance of mechanics.

The art of flying has been attempted by several persons in all ages. The Leucadians, out of superstition, are reported to have had a custom of precipitating a man from a high cliff into the sea, first fixing feathers, variously expanded, round his body, in order to break the fall.

Friar Bacon, who lived near 500 years ago, not only affirms the art of flying possible, but assures us, that he himself knew how to make an engine wherein a man sitting might be able to convey himself through the air like a bird; and further adds, that there was then one who had tried it with success. The secret consisted in a couple of large thin hollow copper-globes, exhausted of air; which being much lighter than air, would sustain a chair whereon a person might sit. Fa. Francisco Lana, in his *Prodromo*, proposes the same thing, as his own thought. He computes, that a round vessel of plate-brass, 14 feet in diameter, weighing

three ounces the square foot, will only weigh 1848 ounces; whereas a quantity of air of the same bulk will weigh 2155 $\frac{3}{4}$ ounces; so that the globe will not only be sustained in the air, but will carry with it a weight of 373 $\frac{3}{4}$ ounces; and by increasing the bulk of the globe, without increasing the thickness of the metal, he adds, a vessel might be made to carry a much greater weight.—But the fallacy is obvious: a globe of the dimensions he describes, Dr Hook shows, would not sustain the pressure of the air, but be crushed inwards. Besides, in whatever ratio the bulk of the globe were increased, in the same must the thickness of the metal, and consequently the weight be increased: so that there would be no advantage in such augmentation. See *AEROSTATION*.

The same author describes an engine for flying, invented by the Sieur Besnier, a smith of Sable, in the county of Main. *Vid. Philosoph. Collect. N° 1.*

The philosophers of king Charles the second's reign were mightily busied about this art. The famous bishop Wilkins was so confident of success in it, that he says, he does not question but in future ages it will be as usual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

FLYING-Bridge. See *BRIDGE*.

FLYING-Fish, a name given by the English writers to several species of fish, which by means of their long fins, have a method of keeping themselves out of water a considerable time. See *EXOCEETUS*.

FLYING-Pinion, is part of a clock, having a fly or fan whereby to gather air, and so bridle the rapidity of the clock's motion, when the weight descends in the striking part.

FO, or *FOE*; an idol of the Chinese. He was originally worshipped in the Indies, and transported from thence into China, together with the fables with which the Indian books were filled. He is said to have performed most wonderful things, which the Chinese have described in several volumes, and represented by cuts.

Señ of Fø. See *CHINA*, n° 103.

Fo-Kien. See *FOKIEN*.

FOAL, or *COLT* and *FILLY*; the young of the horse kind. The word *colt*, among dealers, is understood of the male, as *filly* is of the female. See *COLT*.

FOCUS, in geometry and conic sections, is applied to certain points in the parabola, ellipsis, and hyperbola, where the rays reflected from all parts of these curves concur and meet. See *CONIC SECTIONS*.

Focùs, in optics; a point in which any number of rays, after being reflected or refracted, meet.

FODDER, any kind of meat for horses or other cattle. In some places, hay and straw, mingled together, is peculiarly denominated *fodder*.

FODDER, in the civil law, is used for a prerogative that the prince has, to be provided of corn and other meats for his horses, by the subjects, in his warlike expeditions.

FODDER, in mining, a measure containing 22 hundred and an half weight, though in London but 20 hundred weight.

FOENUGREEK, in botany. See *TRIGONELLA*.

FOENUS NAUTICUM. Where money was lent to a merchant, to be employed in a beneficial trade with condition to be repaid, with extraordinary interest, in case

Flying
Fochus.

Foetus
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Fog.

case such voyage was safely performed, the agreement was sometimes called *fenus nauticum*, sometimes *usura maritima*. But as this gave an opening for usurious and gaming contracts, 19 Geo. II. c. 37. enacts, that all money lent on bottomry, or at *respondentia*, on vessels bound to or from the East Indies, shall be expressly lent only upon the ship or merchandise: the lender to have the benefit of salvage, &c. *Blackst. Com.* II. 459. *Mol. de Jur. Mar.* 361.

FOESIUS (Anulius), a very learned and celebrated physician of the faculty of Paris, born at Mentz in 1528. He translated into Latin the whole works of Hippocrates, judiciously correcting the Greek text as he went along: and composed a kind of dictionary to him, intitled, *Oeconomia Hippocratis*. He translated, beside, the Commentaries of Galen upon the second book of Hippocrates; and was the author of some other works. After practising physic a long time with great success and reputation, at Lorrain and other places, he died in 1596.

FOETOR, in medicine, stinking or fetid effluvia arising from the body or any part thereof.

FOETUS, the young of all viviparous animals whilst in the womb, and of oviparous animals before being hatched: the name is transferred by botanists to the *embryos of vegetables*.

Strictly, the name is applied to the young after it is perfectly formed; till which time it is more properly called EMBRYO. See ANATOMY, n° 109, 110.

In the human foetus are several peculiarities not to be found in the adult; some of them are as follows.
1. The arteries of the navel-string, which are continuations of the hypogastrics, are, after the birth, shrivelled up, and form the ligamenta umbilic. infer.
2. The veins of the navel-string are formed by the union of all the venous branches in the placenta, and passing into the abdomen become the falciform ligament of the liver.
3. The lungs, before being inflated with air, are compact and heavy, but after one inspiration they become light, and as it were spongy: and it may be noted here, that the notion of the lungs sinking in water before the child breathes, and of their swimming after the reception of air, are no certain proofs that the child had or had not breathed, much less that it was murdered: for the uninflated lungs become specifically lighter than water as soon as any degree of putrefaction takes place in them; and this soon happens after the death of the child: besides, where the utmost care hath been taken to preserve the child, it hath breathed once or twice, and then died.
6. The thymus gland is very large in the foetus, but dwindles away in proportion as years advance.
7. The foramen ovale in the heart of a foetus, is generally closed in an adult.

FOG, or MIST, a meteor, consisting of gross vapours, floating near the surface of the earth.

Mists, according to lord Bacon, are imperfect condensations of the air, consisting of a large proportion of the air, and a small one of the aqueous vapour: and these happen in the winter, about the change of the weather from frost to thaw, or from thaw to frost; but in the summer, and in the spring, from the expansion of the dew.

If the vapours, which are raised plentifully from the earth and waters, either by the solar or subterraneous

heat, do at their first entrance into the atmosphere meet with cold enough to condense them to a considerable degree, their specific gravity is by that means increased, and so they will be stopped from ascending; and either return back in form of dew or of drizzling rain, or remain suspended some time in the form of a fog. Vapours may be seen on the high grounds as well as the low, but more especially about marshy places. They are easily dissipated by the wind, as also by the heat of the sun. They continue longest in the lowest grounds, because these places contain most moisture, and are least exposed to the action of the wind.

Hence we may easily conceive, that fogs are only low clouds, or clouds in the lowest region of the air; as clouds are no other than fogs raised on high. See CLOUD.

When fogs stink, then the vapours are mixed with sulphureous exhalations, which smell so. Objects viewed through fogs appear larger and more remote than through the common air. Mr Boyle observes, that upon the coast of Coromandel, and most maritime parts of the East Indies, there are, notwithstanding the heat of the climate, annual fogs so thick, as to occasion people of other nations who reside there, and even the more tender sort of the natives, to keep their houses close shut up.

Fogs are commonly pretty strongly electrified, as appears from Mr Cavallo's observations upon them. See ELECTRICITY, n° 76.

FOGAGE, in the forest-law, is rank grass not eaten up in summer.

FOGLIETA (Oberto or Hubert), a Genoese priest, and one of the most learned writers of the 16th century. He had a share in the disturbances that were raised at Genoa, for which he was banished; and died at Rome in 1581, aged 63. He wrote a history of Genoa in Italian, which is highly esteemed; and many works in Latin.

FOGO, or FUEGO. See FUEGO.

FOHI. See FE; and CHINA, n° 7.

FOIBLE, a French term, frequently used also in our language. It literally signifies *weak*; and in that sense is applied to the body of animals and the parts thereof, as *foible reins*, *foible sight*, &c. being derived from the Italian *fiavole*, of the Latin *febilis*, to be "lamented, pitied."

But it is chiefly used with us substantively, to denote a defect or flaw in a person or thing. Thus we say, Every person has his foible; and the great secret consists in hiding it artfully: Princes are gained by flattery, that is their foible: The foible of young people is pleasure; the foible of old men is avarice; the foible of the great and learned is vanity; the foible of women and girls, coquetry, or an affectation of having gallants: You should know the forte and the foible of a man before you employ him: We should not let people perceive that we know their foible.

FOIL, in fencing, denotes a blunt sword, or one that has a button at the end covered with leather, used in learning the art of fencing.

FOIL, among glass-grinders, a sheet of tin, with quicksilver, or the like, laid on the backside of a looking-glass, to make it reflect. See FOLIATING.

FOIL, among jewellers, a thin leaf of metal placed under

Fogage
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Foil.

Foil
||
Folard.

under a precious stone, in order to make it look transparent, and give it an agreeable different colour, either deep or pale: thus, if you want a stone to be of a pale colour, put a foil of that colour under it; or if you would have it deep, lay a dark one under it.

These foils are made either of copper, gold, or gold and silver together. The copper foils are commonly known by the name of *Nuremberg* or *German foils*; and are prepared as follows: Procure the thinnest copper-plates you can get: beat these plates gently upon a well-polished anvil, with a polished hammer, as thin as possible; and placing them between two iron-plates as thin as writing paper, heat them in the fire; then boil the foil in a pipkin, with equal quantities of tartar and salt, constantly stirring them till by boiling they become white; after which, taking them out and drying them, give them another hammering, till they are made fit for your purpose: however, care must be taken not to give the foils too much heat, for fear of melting; nor must they be too long boiled, for fear of attracting too much salt.

The manner of polishing these foils is as follows: Take a plate of the best copper, one foot long and about five or six inches wide, polished to the greatest perfection; bend this to a long convex, fasten it upon a half roll, and fix it to a bench or table; then take some chalk, washed as clean as possible, and filtered through a fine linen cloth, till it be as fine as you can make it; and having laid some thereof on the roll, and wetted the copper all over, lay your foils on it, and with a polishing stone and the chalk polish your foils till they are as bright as a looking-glass; after which they must be dried, and laid up secure from dust.

FOKIEN, a province of China in Asia, commodiously situated for navigation and commerce, part of it bordering on the sea, in which they catch large quantities of fish, which they send salted to other parts of the empire. Its shores are very uneven, by reason of the number and variety of its bays; and there are many forts built thereon to guard the coast. The air is hot, but pure and wholesome.

The mountains are almost every where disposed into a kind of amphitheatres, by the labour of the inhabitants, with terraces placed one above another. The fields are watered with rivers and springs, which issue out of the mountains, and which the husbandmen conduct in such a manner as to overflow the fields of rice when they please, because it thrives best in watery ground. They make use of pipes of bamboe for this purpose.

They have all commodities in common with the rest of China; but more particularly musk, precious stones, quicksilver, silk, hempen-cloth, callico, iron, and all sorts of utensils wrought to the greatest perfection. From other countries they have cloves, cinnamon, pepper, sandal-wood, amber, coral, and many other things. The capital city is Foutcheou Fou; or, as others would have it written, Fucherosu. But as for Fokien, which most geographers make the capital, Grosier informs us there is no such place.

FOLARD (Charles), an eminent Frenchman, famous for his skill and knowledge in the art military, was born at Avignon in 1669, of a noble family, but not a rich one. He discovered an early turn for the

Nº 128.

sciences, and a strong passion for arms; which last was so inflamed by reading Cæsar's Commentaries, that he enlisted at 16 years of age. His father got him off, and shut him in a monastery: but he made his escape in about two years after, and entered himself a second time in quality of cadet. His inclination for military affairs, and the great pains he took to accomplish himself in that way, recommended him to notice; and he was admitted into the friendship of the first-rate officers. M. de Vendome, who commanded in Italy in 1720, made him his aid-de-camp, having conceived the highest regard for him; and soon after sent him with part of his forces into Lombardy. He was entirely trusted by the commander of that army; and no measures were concerted, or steps taken, without consulting him. By pursuing his plans, many places were taken, and advantages gained; and such, in short, were his services, that he had a pension of 400 livres settled upon him, and was honoured with the cross of St Lewis. He distinguished himself greatly, August 15. 1705, at the battle of Cassano; where he received a wound upon his left hand, which deprived him of the use of it ever after. It was at this battle that he conceived the first idea of that system of columns, which he afterwards prefixed to his *Commentaries upon Polybius*. The duke of Orleans sending de Vendome again into Italy in 1706, Folard had orders to throw himself into Modena to defend it against Eugene: where, tho' he acquitted himself with his usual skill, he was very near being assassinated. The description which he has given of the conduct and character of the governor of this town, may be found in his *Treatise of the Defence of Places*, and deserves to be read. He received a dangerous wound on the thigh at the battle of Malplaquet, and was some time after made prisoner by prince Eugene. Being exchanged in 1711, he was made governor of Bourbourg. In 1714 he went to Malta, to assist in defending that island against the Turks. Upon his return to France, he embarked for Sweden, having a passionate desire to see Charles XII. He acquired the esteem and confidence of that famous general, who sent him to France to negotiate the re-establishment of James II. upon the throne of England; but that project being dropped, he returned to Sweden, followed Charles XII. in his expedition to Norway, and served under him at the siege of Frederickshall, where that prince was killed, Dec. 11. 1718. Folard then returned to France; and made his last campaign in 1719, under the duke of Berwick, in quality of colonel. From that time he applied himself intently to the study of the art military as far as it could be studied at home; and built his theories upon the foundation of his experience and observations on facts. He contracted an intimacy with count Saxe, who, as he then declared, would one day prove a very great general. He was chosen a fellow of the Royal Society at London in 1749; and, in 1751, made a journey to Avignon, where he died in 1752, aged 83 years. He was the author of several works, the principal of which are, 1. *Commentaries upon Polybius*, in six volumes, 4to. 2. *A Book of new Discoveries in War*. 3. *A Treatise concerning the Defence of Places*, &c. in French. Those who would know more of this eminent foldier, may consult a French piece, intitled,

Folard.

Folc-lands
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Folengio.

Folia
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Folia.

titled, *Mémoires pour servir à l'Histoire de M. de Chabrier de Folard*. Ratibone, 1753, 12mo.

FOLC-LANDS, (Sax.) copy-hold lands so called in the time of the Saxons, as charter-lands were called *boc-lands*, Kitch. 174. *Folkland* was *terra vulgi* or *popularis*; the land of the vulgar people, who had no certain estate therein, but held the same, under the rents and services accustomed or agreed, at the will only of their lord the thane; and it was therefore not put in writing, but accounted *pradium rusticum et ignobile*. Spelm. of Feuds, c. 5.

FOLCMOTE, or FOLKMOTE, (Sax. *Folegemot*, i. e. *conventus populi*), is compounded of *folk*, *populus*, and *mote*, or *gemote*, *convenire*; and signified originally, as Somner in his Saxon Dictionary informs us, a general assembly of the people, to consider of and order matters of the commonwealth. And Sir Henry Spelman says, the *folcmote* was a sort of annual parliament, or convention of the bishops, thanes, aldermen, and freemen, upon every May-day yearly; where the laymen were sworn to defend one another and the king, and to preserve the laws of the kingdom; and then consulted of the common safety. But Dr Brady infers from the laws of the Saxon kings of England, that it was an inferior court, held before the king's reeve or steward, every month, to do *folk* right, or compose smaller differences, from whence there lay appeal to the superior courts; *Gloss.* p. 48. Squire seems to think the *folcmote* not distinct from the *shiremote*, or common general meeting of the county. See his *Angl. Sax. Gov.* 155. n.

Manwood mentions *folcmote* as a court holden in London, wherein all the *folk* and people of the city did complain of the mayor and aldermen, for misgovernment within the said city; and this word is still in use among the Londoners, and denotes *celebrem ex tota civitate conventum*. *Stow's Survey*. According to Kennet, the *folcmote* was a common-council of all the inhabitants of a city, town, or borough, convened often by sound of bell, to the *Mote Hall*, or *Houfe*; or it was applied to a larger congress of all the freemen within a county, called the *shire-mote*, where formerly all knights and military tenants did fealty to the king, and elected the annual sheriff on the 1st of October; till this popular election, to avoid tumults and riots, devolved to the king's nomination, anno 1315, 3 Edw. 1. After which the city *folcmote* was swallowed up in a select committee or common-council, and the country *folcmote* in the sheriff's tourn and assizes.

The word *folcmote* was also used for any kind of popular or public meeting; as of all the tenants at the *court-leet*, or *court-baron*, in which signification it was of a less extent. *Paroch. Antiq.* 120.

FOLENGIO (Theophilus), of Mantua, known also by the title of *Merlin Coccaye*, an Italian poet, remarkable for giving to a poem a name which has been adopted ever since for all trifling performances of the same species, consisting of buffoonry, puns, anagrams, wit without wisdom, and humour without good sense. His poem was called *The Macaroni*, from an Italian cake of the same name, which is sweet to the taste, but has not the least alimentary virtue, on the contrary palliates the appetite and cloyes the stomach. These idle poems, however, became the reigning taste in Italy and in France: they gave birth to macaroni academies; and, reaching England, to macaroni clubs; till, in the end, every thing insipid, contemptible, and ridiculous, in the character, dress, or behaviour, of both men and women, is now summed up in the despicable appellation of a *macaroni*. Folengio died in 1544.

FOLIA, among botanists, particularly signify the leaves of plants; those of flowers being expressed by the word *petals*. See LEAF.

FOLIAGE, a cluster or assemblage of flowers, leaves, branches, &c.

FOLIAGE, is particularly used for the representations of such flowers, leaves, branches, rinds, &c. whether natural or artificial, as are used for enrichments on capitals, friezes, pediments, &c.

FOLIATING of LOOKING-GLASSES, the spreading the plates over, after they are polished, with quicksilver, &c. in order to reflect the image. It is performed thus: A thin blotting paper is spread on the table, and sprinkled with fine chalk; and then a fine lamina or leaf of tin, called *foil*, is laid over the paper; upon this is poured mercury, which is to be distributed equally over the leaf with a hare's-foot or cotton: over this is laid a clean paper, and over that the glass-plate, which is pressed down with the right-hand, and the paper drawn gently out with the left: this being done, the plate is covered with a thicker paper, and loaded with a greater weight, that the superfluous mercury may be driven out and the tin adhere more closely to the glass. When it is dried, the weight is removed, and the looking-glass is complete.

Some add an ounce of marcasite, melted by the fire; and, lest the mercury should evaporate in smoke, they pour it into cold water; and when cooled, squeeze through a cloth, or through leather.

Some add a quarter of an ounce of tin and lead to the marcasite, that the glass may dry the sooner.

FOLIATING of Globe Looking-glasses, is done as follows: Take five ounces of quicksilver and one ounce of bismuth; of lead and tin, half an ounce each: first put the lead and tin into fusion, then put in the bismuth; and when you perceive that in fusion too, let it stand till it is almost cold, and pour the quicksilver into it: after this, take the glass-globe, which must be very clean, and the inside free from dust: make a paper-funnel, which put into the hole of the globe, as near the glass as you can, so that the amalgam, when you pour it in, may not splash, and cause the glass to be full of spots; pour it in gently, and move it about, so that the amalgam may touch every where: if you find the amalgam begin to be curdly and fixed, then hold it over a gentle fire, and it will easily flow again; and if you find the amalgam too thin, add a little more lead, tin, and bismuth to it. The finer and clearer your globe is, the better will the looking-glass be.

Dr Shaw observes, that this operation has considerable advantages, as being performable in the cold; and that it is not attended with the danger of poisonous fumes from arsenic, or other unwholesome matters, usually employed for this purpose: besides, how far it is applicable to the more commodious foliating of the common looking-glasses, and other speculums, he thinks, may deserve to be considered.

FOLIO, in merchants books, denotes a page, or rather both the right and left hand pages, these being

Folio
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Follis.

expressed by the same figure, and corresponding to each other. See BOOK-KEEPING.

FOLIO, among printers and booksellers, the largest form of books, when each sheet is so printed that it may be bound up in two leaves only.

FOLIS. See FOLLIS.

FOLIUM, or LEAF, in botany. See LEAF.

FOLKES (Martin), an English antiquary, mathematician, and philosopher, was born at Westminster about 1690; and was greatly distinguished as a member of the Royal Society in London, and of the Academy of Sciences at Paris. He was admitted into the former at 24 years of age; made one of their council two years after; named by Sir Isaac Newton himself as vice-president; and, after Sir Hans Sloane, became president. There are numerous Memoirs of his in the Philosophical Transactions. Coins, ancient and modern, were a great object with him; and his last production was a book upon the English Silver Coin, from the conquest to his own times. He died at London in 1754. Dr Birch had drawn up materials for a life of Mr Folkes, which are preserved at large in the Anecdotes of Bowyer, p. 562. *et seq.*

FOLKESTONE, a town of Kent, between Dover and Hythe, 72 miles from London, appears to have been a very ancient place, from the Roman coins and British bricks often found in it. Stillingfleet and Tanner take it for the *Lapis Tituli* of Nennius. It was burnt by Earl Godwin, and by the French in the reign of Edward III. It had five churches, now reduced to one. It is a member of the town and port of Dover; and has a weekly market and an annual fair. It is chiefly noted for the multitude of fishing-boats that belong to its harbour, which are employed in the season in catching mackerel for London; to which they are carried by the mackerel-boats of London and Barking. About Michaelmas, the Folkestone-barks, with others from Sussex, go away to the Suffolk and Norfolk coasts, to catch herrings for the merchants of Yarmouth and Lowestoff.—Folkestone gives title of *Viscount* to William Henry Bouverie, whose grandfather, Jacob, was so created in 1747. It has been observed of some hills in this neighbourhood, that they have visibly sunk and grown lower within memory.

FOLKLAND, and FOLKMOTE. See FOLCLAND.

FOLLICULUS, (from *folliculus*, "a bag,") a species of seed-vessel first mentioned by Linnæus in his *Delineatio plantæ*, generally consisting of one valve, which opens from bottom to top on one side, and has no future for fastening or attaching the seeds within it.

FOLLICULI are likewise defined by the same author to be small glandular vessels distended with air, which appear on the surface of some plants; as at the root of water-milfoil, and on the leaves of aldrovanda. In the former, the vessels in question are roundish, and furnished with an appearance like two horns; in the latter, pot-shaped, and semicircular.

FOLLIS, or FOLIS, anciently signified a little bag or purse; whence it came to be used for a sum of money, and very different sums were called by that name: thus the scholiast on the Basilics, mentions a follis of copper which was worth but the 24th part of the miliarenfis; the glossæ nomicæ, quoted by Gronovius and others, one of 125 miliarenfis, and another of 250

denarii, which was the ancient sestertium; and three different sums of eight, four, and two pound of gold, were each called *folliculus*. According to the account of the scholiast, the ounce of silver, which contained 5 miliarenfis of 60 in the pound, was worth 120 follis of copper. The glossographer, describing a follis of 250 denarii, says it was equal to 312 pounds 6 ounces of copper; and as the denarius of that age was the 8th part of an ounce, an ounce of silver must have been worth 120 ounces of copper; and therefore the scholiast's follis was an ounce of copper, and equal to the glossographer's nummus. But as Constantine's copper money weighed a quarter of a Roman ounce, the scholiast's follis and the glossographer's nummus contained four of them, as the ancient nummus contained four asses.

FOLLY, according to Mr Locke, consists in the drawing of false conclusions from just principles; by which it is distinguished from madness, which draws just conclusions from false principles.

But this seems too confined a definition; *folly*, in its most general acceptation, denoting a weakness of intellect or apprehension, or some partial absurdity in sentiment or conduct.

FOMAHANT, in astronomy, a star of the first magnitude in the constellation AQUARIUS.

FOMENTATION, in medicine, is a fluid externally applied, usually as warm as the patient can bear it, and in the following manner. Two flannel cloths are dipped into the heated liquor, one of which is wrung as dry as the necessary speed will admit, then immediately applied to the part affected; it lies on until the heat begins to go off, and the other is in readiness to apply at the instant in which the first is removed: thus these flannels are alternately applied, so as to keep the affected part constantly supplied with them warm. This is continued 15 or 20 minutes, and repeated two or three times a-day.

Every intention of relaxing and soothing by fomentations may be answered as well by warm water alone as when the whole tribe of emollients are boiled in it; but when discutients or antiseptics are required, such ingredients must be called in as are adapted to that end.

The degree of heat should never exceed that of producing a pleasing sensation; great heat produces effects very opposite to that intended by the use of fomentations.

FONG-YANG, a city of China, in the province of KIANG-NAN. It is situated on a mountain, which hangs over the yellow river, and incloses with its walls several fertile little hills. Its jurisdiction is very extensive: for it comprehends 18 cities; 5 of which are of the second, and 13 of the third class. As this was the birth-place of the emperor Hong-vou, chief of the preceding dynasty, this prince formed a design of rendering it a famous and magnificent city, in order to make it the seat of empire. After having expelled the western Tartars, who had taken possession of China, he transferred his court hither, and named the city *Fong-yang*; that is to say, "The Place of the Eagle's Splendor." His intention, as we have said, was to beautify and enlarge it; but the inequality of the ground, the scarcity of fresh water, and above all the vicinity of his father's tomb, made him change his design. By the

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the unanimous advice of his principal officers, this prince established his court at NAN-KING, a more beautiful and commodious place. When he had formed this resolution, a stop was put to the intended works: the imperial palace which was to have been inclosed by a triple wall, the walls of the city to which a circumference of nine leagues were assigned, and the canals that were begun, all were abandoned; and nothing was finished but three monuments, which still remain. The extent and magnificence of these sufficiently show what the beauty of this city would have been, had the emperor pursued his original design. The first is the tomb of the father of Hong-vou, to decorate which no expence was spared; it is called *Hoan-lin*, or the *Royal Tomb*. The second is a tower built in the middle of the city, which is of an oblong form, and 100 feet high. The third is a magnificent temple erected to the god Fo. At first it was only a pagod, to which Hong-vou retired after having lost his parents, and where he was admitted as an inferior domestic; but, having soon become weary of this kind of life, he enlisted with the chief of a band of banditti, who had revolted from the Tartars. As he was bold and enterprising, the general made choice of him for his son-in-law; soon after, he was declared his successor by the unanimous voice of the troops. The new chief, seeing himself at the head of a large party, had the presumption to carry his views to the throne. The Tartars, informed of the progress of his arms, sent a numerous army into the field: but he surprised and attacked them with so much impetuosity, that they were obliged to fly; and, though they several times returned to the charge, they were still defeated, and at length driven entirely out of China. As soon as he mounted the throne, he caused the superb temple which we have mentioned, to be raised out of gratitude to the Bonzes, who had received him in his distress, and assigned them a revenue sufficient for the maintenance of 300 persons, under a chief of their own sect, whom he constituted a mandarin, with power of governing them, independent of the officers of the city. This pagod was supported as long as the preceding dynasty lasted; but that of the eastern Tartars, which succeeded, suffered it to fall to ruin.

Fong-Choui, the name of a ridiculous superstition among the Chinese. See CHINA, n° 105.

FONT, among ecclesiastical writers, a large basin, in which water is kept for the baptizing of infants or other persons.

FONT, in the art of printing, denotes a complete assortment of letters, accents, &c. used in printing. See FOUNT.

FONTAINE (John), the celebrated French poet, and one of the first rate geniuses of his age, was born at Chateau Thierri in Champagne, the 8th of July 1621, of a good extraction. At the age of 19 he entered amongst the Oratorians, but quitted that order 18 months after. He was 22 years of age before he knew his own talents for poetry; but hearing an ode of Malherbe read, upon the assassination of Henry IV. he was so taken with admiration of it, that the poetical fire, which had before lain dormant within him, seemed to be enkindled from that of the other great poet. He applied himself to read, to meditate, to repeat, in fine, to imitate, the works of Malherbe. The

first essays of his pen he confined to one of his relations, who made him read the best Latin authors, Horace, Virgil, Terence, Quintilian, &c. and then the best compositions in French and Italian. He applied himself likewise to the study of the Greek authors, particularly Plato and Plutarch. Some time afterwards his parents made him marry a daughter of a lieutenant-general, a relation of the great Racine. This young lady, besides her very great beauty, was remarkable for the delicacy of her wit, and Fontaine never composed any work without consulting her. But as her temper was none of the best, to avoid dissension, he separated himself from her company as often as he well could. The famous duchess of Bouillon, niece to cardinal Mazarine, being exiled to Chateau Thierri, took particular notice of Fontaine. Upon her récal, he followed her to Paris; where, by the interest of one of his relations, he got a pension settled upon him. He met with great friends and protectors amongst the most distinguished persons of the court, but madam de la Sabliere was the most particular. She took him to live at her house; and it was then that Fontaine, divested of domestic concerns, led a life conformable to his disposition, and cultivated an acquaintance with all the great men of the age. It was his custom, after he was fixed at Paris, to go every year, during the month of September, to his native place of Chateau-Thierri, and pay a visit to his wife, carrying with him Racine, Despreaux, Chapelle, or some other celebrated writers. When he has sometimes gone thither alone by himself, he has come away without remembering even to call upon her; but seldom omitted selling some part of his lands, by which means he squandered away a considerable fortune. After the death of madame de la Sabliere, he was invited into England, particularly by madame Mazarin, and by St Evremond, who promised him all the sweets and comforts of life; but the difficulty of learning the English language, and the liberality of the duke of Burgundy, prevented his voyage.

About the end of the year 1692 he fell dangerously ill; and, as is customary upon these occasions in the Romish church, he made a general confession of his whole life to P. Pogue, an oratorian; and, before he received the sacrament, he sent for the gentlemen of the French academy, and in their presence declared his sincere compunction for having composed his *Tales*; a work he could not reflect upon without the greatest repentance and detestation; promising, that if it should please God to restore his health, he would employ his talents only in writing upon matters of morality or piety. He survived this illness two years, living in the most exemplary and edifying manner, and died the 13th of March 1695, being 74 years of age. When they stripped his body, they found next his skin a hair-shirt; which gave room for the following expression of the younger Racine:

Et l'Auteur de Jaconde est orme d'un Cilice.

Fontaine's character is remarkable for a simplicity, candour, and probity, seldom to be met with. He was of an obliging disposition; cultivating a real friendship with his brother poets and authors; and, what is very rare, beloved and esteemed by them all. His conversation was neither gay nor brilliant, especially when he was not among his intimate friends. One

Fontaine,
Fontain-
bleau.

day being invited to dinner at a farmer-general's, he eat a great deal, but did not speak. Rising up from table very early, under pretext of going to the academy, one of the company represented to him that it was not yet a proper time: "Well (says he), if it is not, I will stay a little longer." He had one son by his wife in the year 1660. At the age of 14, he put him into the hands of M. de Harley, the first president, recommending to him his education and fortune. It is said, that having been a long time without seeing him, he happened to meet him one day visiting, without recollecting him again, and mentioned to the company that he thought that young man had a good deal of wit and understanding. When they told him it was his own son, he answered in the most tranquil manner, "Ha! truly I am glad on't." An indifference, or rather an absence of mind, influenced his whole conduct, and rendered him often insensible to the inclemency of the weather. Madame de Bouillon going one morning to Versailles, saw him, abstracted in thought, sitting in an arbour; returning at night, she found him in the same place, and in the same attitude, although it was very cold and had rained almost the whole day. He carried this simplicity so far, that he was scarce sensible of the bad effects some of his writings might occasion, particularly his tales. In a great sickness, his confessor exhorted him to prayer and alms-deeds: "As for alms-deeds (replied Fontaine), I am not able, having nothing to give; but they are about publishing a new edition of my Tales, and the bookseller owes me a hundred copies; you shall have them to sell, and distribute their amount amongst the poor." Another time P. Poguët exhorted him to repent of his faults, "If he has committed any (cried the nurse), I am sure it is more from ignorance than malice, for he has as much simplicity as an infant." One time having composed a tale, wherein he made a profane application of those words of the Gospel, "Lord, five talents thou didst deliver to me," he dedicated it, by a most ingenious prologue, to the celebrated Arnauld, telling him, it was to show to posterity the great esteem he had for the learned doctor. He was not sensible of the indecency of the dedication, and the profane application of the text, till Boileau and Racine represented it to him. He addressed another, by a dedication in the same manner to the archbishop of Paris. His Fables are an immortal work, exceeding every thing in that kind, both ancient and modern, in the opinion of the learned. People of taste, the oftener they read them, will find continually new beauties and charms, not to be met with elsewhere. The descendants of this great poet are exempted in France from all taxes and impositions, a privilege which the intendants of Soissons to this day think it an honour to confirm to them.

FONTAINBLEAU, a town in the Isle of France, and in the Gatinois, remarkable for its fine palace, which has been the place where the kings of France used to lodge when they went a-hunting. It was first embellished by Francis I. and all the successive kings have added something thereto; inasmuch that it may now be called the finest pleasure-house in the world. It stands in the midst of a forest, consisting of 26,424 arpents of land, each containing 100 square perches, and each perch 18 feet. E. Long. 2. 33. N. Lat. 40. 22.

FONTAINES (Peter Francis), a French critic, Fontaines, was born of a good family at Rouen in 1685. At 15, Fontarabia. he entered into the society of the Jesuits; and at 30, he quitted it, for the sake of returning to the world. He was a priest, and had a cure in Normandy; but left it, and was, as a man of wit and letters, some time with the cardinal d'Auvergne. Having excited some attention at Paris by certain critical productions, the Abbé Bignon in 1724 committed to him the *Journal des Sçavans*. He acquitted himself well in this department, and was peaceably enjoying the applauses of the public, when his enemies, whom by critical strictures in his Journal he had made such, formed an accusation against him of a most abominable crime, and procured him to be imprisoned. By the credit of powerful friends, he was set at liberty in 15 days: the magistrate of the police took upon himself the trouble of justifying him in a letter to the Abbé Bignon; and this letter having been read amidst his fellow-labourers in the Journal, he was unanimously re-established in his former credit. This happened in 1725. But with whatever repute he might acquit himself in this Journal, frequent disquiets made him frequently abandon it. He laboured mean while in some new periodical works, from which he derived his greatest fame. In 1731, he began one under the title of *Nowvelliſſe du Parnasse, ou Reflexions sur les Ouvrages nouveaux*: but only proceeded to two volumes; the work having been suppressed by authority, from the incessant complaints of authors ridiculed therein. About three years after, in 1735, he obtained a new privilege for a periodical production, intitled, *Observations sur les Ecrits Modernes*; which, after continuing to 33 volumes, was suppressed again in 1743. Yet the year following, 1744, he published another weekly paper, called, *Jugemens sur les Ouvrages nouveaux*, and proceeded to 11 volumes: the two last being done by other hands. In 1745, he was attacked with a disorder in the breast, which ended in a drop-sy that proved fatal in five weeks. "He was (says M. Freron) born a sentimental person; a philosopher in conduct as well as in principle; exempt from ambition; and of a noble firm spirit, which would not submit to sue for preferments or titles. In common conversation, he appeared only a common man; but when subjects of literature, or any thing out of the ordinary way, were agitated, he discovered great force of imagination and wit." Besides the periodical works mentioned above, he was the author of many others: his biographer gives us no less than 17 articles; many of them critical, some historical, and some translations from English writers, chiefly from Pope, Swift, Fielding, &c. The Abbé de la Porte, published, in 1757, *L'Esprit de l'Abbé des Fontaines*, in 4 vols 12mo; prefixed to which is the Life of Fontaines, a catalogue of his works, and another catalogue of writings against him.

FONTANELLA, in anatomy, imports the quadrangular aperture found betwixt the os frontis and ossa incisivis, in children just born; which is also called *font. pulsatilis*.

FONTARABIA, a sea-port town of Spain in Biscay, and in the territory of Guipuscoa, seated on a peninsula on the sea-shore, and on the river Bidassoa. It is small, but well fortified both by nature and art; and has a good harbour, though dry at low water. It

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Fontevraud.

is built in the form of an amphitheatre, on the declivity of an hill, and surrounded on the land side by the high Pyrenean mountains. It is a very important place, being accounted the key of Spain on that side. W. Long. 1. 43. N. Lat. 43. 23.

FONTENAY, (John Baptist Blain de), a very famous painter of fruit and flowers, was born at Caen in 1654. Louis XIV. gave him a pension, and an apartment in the galleries of the Louvre; and he was nominated counsellor of the Academy of Painting. His fruit and flowers have all the freshness and beauty of nature; the very dew seems to trickle down their stalks, with all the lustre and transparency of the diamond, while the insects upon them seem perfectly alive and animated. This ingenious painter died at Paris in 1715.

FONTENELLE, (Bernard de), a celebrated French author, was born in 1657, and died in 1756, when he was near 100 years old. He discharged the trust of perpetual secretary to the Academy of Sciences above 40 years with universal applause; and his History of the Academy of Sciences throws a great light upon their memoirs, which are very obscure. The eulogies which he pronounced on the deceased members of the academy, have this peculiar merit, that they excite a respect for the sciences as well as for the author. In his poetical performances, and the Dialogues of the Dead, the spirit of Voiture was discernible, though more extended and more philosophical. His Plurality of Worlds, is a work singular in its kind: the design of which was to present that part of philosophy to view in a gay and pleasing dress. In his more advanced years, he published comedies, which, though they showed the elegance of Fontenelle, were little fitted for the stage; and An Apology for Des Cartes's Vortices. M. de Voltaire, who declares him to have been the most universal genius the age of Louis XIV. produced, says, "We must excuse his comedies, on account of his great age; and his Cartesian opinions, as they were those of his youth, when they were universally received all over Europe."

FONTENOY, a town or village of the Austrian Netherlands, in the province of Hainault, and on the borders of Flanders; remarkable for a battle fought there between the allies and the French on the first of May 1745. The French were commanded by Marshal Saxe, and the allies by the Duke of Cumberland. The latter behaved with great bravery; but through the superiority of the numbers of the French army, and likewise the superior generalship of their commander, the allies were defeated with great slaughter. The British troops behaved with astonishing intrepidity, as their enemies themselves owned. It is even said, that the battle was lost through the cowardice of the Dutch, who failed in their attack on the village of Fontenoy, on which the event of the day depended. E. Long. 2. 20. N. Lat. 50. 35.

FONTENOY, a village of France, in the duchy of Burgundy, remarkable for a bloody battle fought there in 841, between the Germans and the French, in which were killed above 100,000 men; and the Germans were defeated. E. Long. 3. 48. N. Lat. 47. 28.

Fontevraud, or Frontevaux (Order of), in ecclesiastical history, a religious order instituted by Robert d'Arbrissel, about the latter end of the 11th cen-

tury, and taken under the protection of the holy see by pope Pascal II. in 1106, confirmed by a bull in 1113, and invested by his successors with very extraordinary privileges. The chief of this order is a female, who is appointed to inspect both the monks and nuns. The order is divided into four provinces, which are those of France, Aquitaine, Auvergne, and Bretagne, in each of which they have several priories.

FONTICULUS, or FONTANELLA, in surgery, an issue, seton, or small ulcer, made in various parts of the body, in order to eliminate the latent corruption out of it.

FONTINALIA, or FONTANALIA, in antiquity, a religious feast held among the Romans in honour of the deities who presided over fountains or springs. Varro observes, that it was the custom to visit the wells on those days, and to cast crowns into fountains. Scaliger, in his conjectures on Varro, takes this not to be a feast of fountains in general, as Festus insinuates, but of the fountain which had a temple at Rome, near the Porta Capena, called also *Porta Fontinalis*: he adds, that it is of this fountain Cicero speaks in his second book *De legib.* - The fontinalia were held on the 13th of October.

FONTINALIS, WATER-MOSS, in botany: A genus of the natural order of musci, belonging to the cryptogamia class of plants. The anthera is hooded; the calyptra, or covering of the anthera, sessile, inclosed in a perichætium or empalement of leaflets different from those of the rest of the plant. There are four species, all of them natives of Britain. They grow on the brinks of rivulets, and on the trunks of trees. The most remarkable is the antipyretica, with purple stalks. The Scandinavians line the insides of their chimneys with this moss, to defend them against the fire; for, contrary to the nature of all other moss, this is scarcely capable of burning.

FOOD, in the most extensive signification of the word, implies whatever aliments are taken into the body, whether solid or fluid; but, in common language, it is generally used to signify only the solid part of our aliment.

We are told, that in the first ages men lived upon acorns, berries, and such fruits as the earth spontaneously produces; then they proceeded to eat the flesh of wild animals taken in hunting: But their numbers decreasing and mankind multiplying, necessity taught them the art of cultivating the ground, to sow corn, &c. By and by they began to assign to each other, by general consent, portions of land to produce them their supply of vegetables; after this, reason suggested the expedient of domesticating certain animals, both to assist them in their labours and supply them with food. Hogs were the first animals of the domestic kind that appeared upon their tables; they held it to be ungrateful to devour the beasts that assisted them in their labours.—When they began to make a free use of domestic animals, they roasted them only; boiling was a refinement in cookery which for ages they were strangers to; and fish living in an element men were unused to, were not eaten till they grew somewhat civilized. Menelaus complains, in the *Odyssey*, that they had been constrained to feed upon them.

The most remarkable distinction of foods, in a medical view, is into those which are already assimilated into

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Food.

Food.

into the animal nature, and such as are not. Of the first kind are animal substances in general; which if not entirely similar, are nearly so, to our nature. The second comprehends vegetables, which are much more difficultly assimilated. But as the nourishment of all animals, even those which live on other animals, can be traced originally to the vegetable kingdom, it is plain, that the principle of all nourishment is in vegetables.

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Though there is perhaps no vegetable which does not afford nourishment to some species of animals or other; yet, with regard to mankind, a very considerable distinction is to be made. Those vegetables which are of a mild, bland, agreeable taste, are proper nourishment; while those of an acrid, bitter, and nauseous nature, are improper. We use, indeed, several acrid substances as food; but the mild, the bland, and agreeable, are in the largest proportion in almost every vegetable. Such as are very acrid, and at the same time of an aromatic nature, are not used as food, but as spices or condiments, which answer the purposes of medicine rather than any thing else. Sometimes, indeed, acrid and bitter vegetables seem to be admitted as food. Thus celeri and endive are used in common food, though both are substances of considerable acrimony; but it must be observed, that, when we use them, they are previously blanched, which almost totally destroys their acrimony. Or if we employ other acrid substances, we generally, in a great measure, deprive them of their acrimony by boiling. In different countries the same plants grow with different degrees of acrimony. Thus, garlic here seldom enters our food; but in the southern countries, where the plants grow more mild, they are frequently used for that purpose. The plant which furnishes cassada, being very acrimonious, and even poisonous, in its recent state, affords an instance of the necessity of preparing acrid substances even in the hot countries: and there are other plants, such as arum-root, which are so exceedingly acrimonious in their natural state, that they cannot be swallowed with safety; yet, when deprived of that acrimony, will afford good nourishment.

The most remarkable properties of different vegetable substances as food, are taken notice of under their different names; here we shall only compare vegetable foods in general with those of the animal kind.

I. *In the Stomach*, they differ remarkably, in that the vegetables always have a tendency to acidity, while animal food of all kinds tend rather to alkalescence and putrefaction. Some animal foods, indeed, turn manifestly acid before they putrify; and it has been asserted, that some degree of acescency takes place in every kind of animal food before digestion. This acescency of animal food, however, never comes to any morbid degree, but the disease is always on the side of putrefaction. The acescency of vegetables is more frequent, and ought to be more attended to, than the alkalescence of animal food; which last, even in weak stomachs, is seldom felt; while acescency greatly affects both the stomach and system.

With regard to their difference of *solution*:—Heaviness, as it is called, is seldom felt from vegetables, except from tough farinaceous paste, or the most viscid substances; while the heaviness of animal food is more frequently noticed, especially when in any great quan-

Food. tity. Difficulty of solution does not depend so much on firmness of texture (as a man, from fish of all kinds, is more oppressed than from firmer substances) as on viscidness; and hence it is more frequent in animal food, especially in the younger animals.

With regard to *mixture*:—There is no instance of difficult mixture in vegetables, except in vegetable oils; while animal foods, from both viscidness and oiliness, especially the fatter meats, are refractory in this respect. Perhaps the difference of animal and vegetable foods might be referred to this head of mixture. For vegetable food continues long in the stomach, giving little stimulus: Now the system is affected in proportion to the extent of this stimulus, which is incomparably greater from the animal viscid oily food, than from the vegetable, firmer, and more aqueous. However, there are certain applications to the stomach, which have a tendency to bring on the cold fit of fever, independent of stimulus, merely by their refrigeration: and this oftener arises from vegetables; as we see, in those hot countries where intermittents prevail, they are oftener induced from a surfeit of vegetable than of animal food. A proof of this is, that when one is recovering of an intermittent, there is nothing more apt to cause a relapse than cold food, especially if taken on those days when the fit should return, and particularly acefcent, fermentable vegetables, as salad, melons, cucumbers, &c. *acido dulces*, &c. which, according to Dr Cullen, are the most frequent causes of epidemics; therefore, when an intermittent is to be avoided, we shun vegetable diet, and give animal foods, although their stimulus be greater.

II. *In the Intestines*. When the putrescency of animal food has gone too far, it produces an active stimulus, causing diarrhoea, dysentery, &c. But these effects are but rare: whereas from vegetable food and its acid, which, united with the bile, proves a pretty strong stimulus, they more frequently occur; but, luckily, are of less consequence, if the refrigeration is not very great. In the autumnal season, when there is a tendency to dysentery, if it is observed that eating of fruits brings it on, it is rather to be ascribed to their cooling than stimulating the intestines.

As to *stool*—Wherever neither putrefaction nor acidity has gone a great length, animal food keeps the belly more regular. Vegetable food gives a greater proportion of feculent matter, and, when exiccated by the stomach and intestines, is more apt to stagnate, and produce slow-belly and costiveness, than animal stimulating food; which, before it comes to the great guts, where stoppage is made, has attained a putrefactive tendency, and gives a proper stimulus: and thus those who are costive from the use of vegetables, when they have recourse to animal food are in this respect better.

III. *In the blood-vessels*. They both give a blood of the same kind, but of different quality. Animal food gives it in greater quantity, being in great part, as the expression is, convertible in *succum et sanguineum*, and of easy digestion; whereas vegetable is more watery, and contains a portion of unconquerable saline matter, which causes it to be thrown out of the body by some excretion. Animal food affords a more dense stimulating elastic blood than vegetable; stretching and causing a greater resistance in the solids, and again exciting their stronger action. It has been supposed, that
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acrescency of vegetable food is carried into the blood-vessels, and there exerts its effects; but the tendency of animal fluids is so strong to alkalescency, that the existence of an acid acrimony in the blood seems very improbable. Animal food alone will soon produce an alkalescent acrimony; and if a person who lives entirely on vegetables were to take no food for a few days, his acrimony would be alkalescent.

IV. We are next to take notice of the *quantity of nutriment* these different foods afford. Nutriment is of two kinds: the first repairs the waste of the solid fibres; the other supplies certain fluids, the chief of which is oil. Now, as animal food is easier converted, and also longer retained in the system, and as it contains a greater proportion of oil, it will afford both kinds of nutriment more copiously than vegetables.

V. Lastly, *As to the different degrees of perspirability of these foods.* This is not yet properly determined. Sanctorius constantly speaks of mutton as the most perspirable of all food, and of vegetables as checking perspiration. This is a consequence of the different stimulus those foods give to the stomach, so that persons who live on vegetables have not their perspiration so suddenly excited. In time of digestion, perspiration is stopped from whatever food, much more so from cooling vegetables. Another reason why vegetables are less perspirable is, because their aqueo-saline juices determine them to go off by urine, while the more perfectly mixed animal food is more equally diffused over the system, and so goes off by perspiration. Hence Sanctorius's accounts may be understood; for vegetable aliment is not longer retained in the body, but mostly takes the course of the kidneys. Both are equally perspirable in this respect, viz. that a person living on either, returns once a-day to his usual weight; and if we consider the little nourishment of vegetables, and the great tendency of animal food to corpulency, we must allow that vegetable is more quickly perspired than animal food.

As to the question, Whether man was originally designed for animal or vegetable food, see the article **CARNIVOROUS.**

With regard to the effects of these foods on men, it must be observed, that there are no persons who live entirely on vegetables. The Pythagoreans themselves eat milk; and those who do so mostly, as these Pythagoreans, are weakly, sickly, and meagre, labouring under a constant diarrhoea and several other diseases. None of the hardy, robust, live on these; but chiefly such as gain a livelihood by the exertion of their mental faculties, as (in the East Indies) factors and brokers; and this method of life is now confined to the hot climates, where vegetable diet, without inconvenience, may be carried to great excess. Though it be granted, therefore, that man is intended to live on these different foods promiscuously, yet the vegetable should be in very great proportion. Thus the Lappers are said to live entirely on animal food; but this is contradicted by the best accounts; for Linnæus says, that besides milk, which they take four, to obviate the bad effects of animal food, they use also calla, menyanthes, and many other plants, copiously. So there is no instance of any nation living entirely either on vegetable or animal food, though there are indeed some who live particularly on one or other in the great-

est proportion. In the cold countries, e. g. the inhabitants live chiefly on animal food, on account of the rigour of the season, their smaller perspiration, and little tendency to putrefaction.

Of more importance, however, is the following than the former question, viz. *In what proportion animal and vegetable food ought to be mixed?*

1. *Animal food certainly gives most strength to the system.* It is a known aphorism of Sanctorius, that *pondus addit robur*; which may be explained from the impletion of the blood-vessels, and giving a proper degree of tension for the performance of strong oscillations. Now animal food not only goes a greater way in supplying fluid, but also gives the fluid more dense and elastic. The art of giving the utmost strength to the system is best understood by those who breed fighting cocks. These people raise the cocks to a certain weight, which must bear a certain proportion to the other parts of the system, and which at the same time is so nicely proportioned, as that, on losing a few ounces of it, their strength is very considerably impaired. Dr Robinson of Dublin has observed, that the force and weight of the system ought to be determined by the largeness of the heart, and its proportion to the system: for a large heart will give large blood-vessels, while at the same time the viscera are less, particularly the liver; which last being increased in size, a greater quantity of fluid is determined into the cellular texture, and less into the sanguineous system. Hence we see how animal food gives strength, by filling the sanguiferous vessels. What pains we now bestow on cocks, the ancients did on the Athletæ, by proper nourishment bringing them to a great degree of strength and agility. It is said that men were at first fed on figs, a proof of which we have from their nutritious quality: however, in this respect they were soon found to fall far short of animal food; and thus we see, that men, in some measure, will work in proportion to the quality of their food. The English labour more than the Scots; and wherever men are exposed to hard labour, their food should be animal. Animal food, although it gives strength, yet loads the body; and Hippocrates long ago observed, that the athletic habit, by a small increase, was exposed to the greatest hazards. Hence it is only proper for bodily labours, and entirely improper for mental exercises; for whoever would keep his mind acute and penetrating, will exceed rather on the side of vegetable food. Even the body is oppressed with animal food; a full meal always produces dulness, laziness, and yawning; and hence the feeding of gamesters, whose mind must be ready to take advantage, is always performed by avoiding a large quantity of animal food. Farther, with regard to the strength of the body, animal food in the first stage of life is hardly necessary to give strength: in manhood, when we are exposed to active scenes, it is more allowable; and even in the decline of life, some proportion of it is necessary to keep the body in vigour. There are some diseases which come on in the decay of life, at least are aggravated by it; among these the most remarkable is the gout. This, when it is in the system, and does not appear with inflammation in the extremities, has pernicious effects there, attacking the lungs, stomach, head, &c. Now to determine this to the extremities, a large proportion

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of animal food is necessary, especially as the person is commonly incapable of much exercise.

Animal food, although it gives strength, is yet of many hazards to the system, as it produces plethora and all its consequences. As a stimulus to the stomach and to the whole system, it excites fever, urges the circulation, and promotes the perspiration. The system, however, by the repetition of these stimuli, is soon worn out; and a man who has early used the athletic diet, is either early carried off by inflammatory diseases, or, if he takes exercise sufficient to render that diet salutary, such an accumulation is made of putrescent fluids, as in his after-life lays a foundation for the most inveterate chronic distempers. Therefore it is to be questioned, whether we should desire this high degree of bodily strength, with all the inconveniences and dangers attending it. Those who are chiefly employed in mental researches, and not exposed to too much bodily labour, should always avoid an excess of animal food. There is a disease which seems to require animal food, viz. the hyseric or hypochondriac; and which appears to be very much a-kin to the gout, affecting the alimentary canal. All people affected with this disease are much disposed to acescency; which sometimes goes so far, that no other vegetable but bread can be taken in, without occasioning the worst consequences. Here then we are obliged to prescribe an animal diet, even to those of very weak organs; for it generally obviates the symptoms. However, several instances of scurvy in excess have been produced by a long-continued use of this diet, which it is always unlucky to be obliged to prescribe; and when it is absolutely necessary to prescribe, it should be joined with as much of the vegetable as possible, and when a cure is performed we should gradually recur to that again.

2. Next, let us consider the *vegetable* diet. The chief inconveniency of this is difficulty of assimilation; which, however, in the vigorous and exercised, will not be liable to occur. In warm climates, the assimilation of vegetable aliment is more easy, so that *there* it may be more used, and when joined to exercise gives a pretty tolerable degree of strength and vigour; and though the general rule be in favour of *animal* diet, for giving strength, yet there are many instances of its being remarkably produced from vegetable. Vegetable diet has this advantage, that it whets the appetite, and that we can hardly suffer from a full meal of it. Besides the disorders it is liable to produce in the *prima via*, and its falling short to give strength, there seem to be no bad consequences it can produce in the blood-vessels; for there is no instance where its peculiar acrimony was ever carried there, and it is certainly less putrescible than animal food; nor, without the utmost indolence, and a sharp appetite, does it give plethora, or any of its consequences: so that we cannot here but conclude, that a large proportion of vegetable food is useful for the generality of mankind.

There is no error in this country more dangerous, or more common, than the neglect of bread: for it is the safest of vegetable aliment, and the best corrector of animal food; and, by a large proportion of this alone, its bad consequences, when used in a hypochondriac state, have been obviated. The French apparently have as much animal food on their tables as the Britons; and yet, by a greater use of bread and the

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dried acid fruits, its bad effects are prevented; and therefore bread should be particularly used by the English, as they are so voracious of animal food. Vegetable food is not only necessary to secure health, but long life: and, as we have said, in infancy and youth we should be confined to it mostly; in manhood, and decay of life, use animal food; and, near the end, vegetable again.

There is another question much agitated, viz. *What are the effects of variety in food?* Is it necessary and allowable, or universally hurtful? Variety of a certain kind seems necessary; as vegetable and animal foods have their mutual advantages, tending to correct each other. Another variety, which is very proper, is that of liquid and solid food, which should be so managed as to temper each other; and liquid food, especially of the vegetable kind, is too ready to pass off before it is properly assimilated, while solid food makes a long stay. But this does not properly belong to the question, whether variety of the same kind is necessary or proper, as in animal-foods, beef, fish, fowl, &c. It doth not appear that there is any inconvenience arising from this mixture or difficulty of assimilation, provided a moderate quantity be taken. When any inconvenience does arise, it probably proceeds from this, that one of the particular substances in the mixture, when taken by itself, would produce the *same effects*; and, indeed, it would appear, that this effect is not *heightened* by the mixture, but properly *obviated* by it. There are few exceptions to this, if any, e. g. taking a large proportion of acescent substances with milk. The coldness, &c. acidity, flatulency, &c. may appear; and it is possible that the coagulum, from the acescency of the vegetables, being somewhat stronger induced, may give occasion to too long retention in the stomach, and to acidity in too great degree. Again, the mixture of fish and milk often occasions inconveniences. The theory of this is difficult, though, from universal consent, it must certainly be just. Can we suppose that fish gives occasion to such a coagulum as runnet? If it does so, it may produce bad effects. Besides, fishes approach somewhat to vegetables, in giving little stimulus; and are accused of the same bad effects as these, viz. bringing on the cold fit of fever.

Thus much may be said for variety. But it also has its disadvantages, provoking to gluttony; this, and the art of cookery, making men take in more than they properly can digest: and hence, perhaps, very justly, physicians have universally almost preferred simplicity of diet; for, in spite of rules, man's eating will only be measured by his appetite, and satiety is sooner produced by *one* than by *many* substances. But this is so far from being an argument against variety, that it is one for it, as the only way of avoiding a full meal of animal-food, and its bad effects, is by presenting a quantity of vegetables. Another mean of preventing the bad effects of animal-food, is to take a large proportion of liquid; and hence the bad effects of animal-food are less felt in Scotland, on account of their drinking much with it, and using broths, which are at once excellent correctors of animal-food and preventives of gluttony.

WITH regard to the differences between ANIMAL foods, properly so called, the first regards their solubility,

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1. Solubility of animal food seems to deserve less attention than is commonly imagined; for there are many instances of persons of a weak stomach incapable of breaking down the texture of vegetables, or even of dissolving a light pudding, to whom hung beef, or a piece of ham, was very grateful and easily digested. None of the theories given for the solution of animal-food in the human stomach seem to have explained that process sufficiently. Long ago has been discarded the supposition of an active corrosive menstruum there; and also the doctrine of trituration, for which, indeed, there seems no mechanism in the human body; and, till lately, physicians commonly agreed with Boerhaave in supposing nothing more to be necessary than a watery menstruum, moderate heat, and frequent agitation. This will account for solution in some cases, but not entirely. Let us try to imitate it out of the body with the same circumstances, and in ten times the time in which the food is dissolved in the stomach we shall not be able to bring about the same changes. Take the coagulated white of an egg, which almost every body can easily digest, and yet no artifice shall be able to dissolve it. Hence, then, we are led to seek another cause for solution, *viz.* fermentation; a notion, indeed, formerly embraced, but, on the introduction of mechanical philosophy, industriously banished, with every other supposition of that process taking place at all in the animal economy.

Many of the ancients imagined this fermentation to be putrefactive. But this we deny, as an acid is produced; though hence the fermentation might be reckoned the vinous, which, however, seems always to be morbid. Neither, indeed, is the fermentation purely acetous, but modified by putrescence; for Pringle has observed, that animal-matters raise and even expedite the acetous process. The fermentation, then, in the stomach is of a mixed nature, between the acetous and putrefactive, mutually modifying each other; though, indeed, in the intestines, somewhat of the putrefactive seems to take place, as may be observed from the state of the feces broke down, and from the little disposition of such substances to be so, which are not liable to the putrefactive process, as the firmer parts of vegetables, &c. Upon this view solution seems to be extremely easy, and those substances to be most easily broke down which are most subject to putrefaction. See ANATOMY, n° 104. and GASTRIC Juice.

But solution also depends on other circumstances, and hence requires a more particular regard.

1. There is a difference of solubility with respect to the manducation of animal-food, for which bread is extremely necessary, in order to keep the more slippery parts in the mouth till they be properly comminuted*. From want of proper manducation persons are subject to eructations; and this more frequently from the firm vegetable foods, as apples, almonds, &c. than from the animal, though, indeed, even from animal food, very tendinous, or swallowed in unbroken masses, such sometimes occur. Manducation is so much connected with solution, that some, from imperfectly performing that, are obliged to belch up their food, remanducate it, and swallow it again before the stomach can dissolve it, or proper nourishment be extracted. Another

proof of our regard to solubility, is our rejecting the firmer parts of animal-food, as bull-beef, and generally carnivorous animals.

2. Its effects with regard to solubility seem also to be the foundation of our choice between *fat* and *lean*, *young* and *old* meats. In the *lean*, although perhaps a single fibre might be sufficiently tender, yet these, when collected in *fasciculi*, are very firm and compact, and of difficult solution; whereas in the *fat* there is a greater number of vessels, a greater quantity of juice, more interposition of cellular substance, and consequently more solubility. Again, in young animals, there is probably the same number of fibres as in the older, but these more connected: whereas, in the older, the growth depending on the separation of these, and the increase of vessels and cellular substance, the texture is less firm and more soluble; which qualities, with regard to the stomach, are at that time too increased, by the increased alkalescency of the animal. To this also may be referred our choice of castrated animals, *viz.* on account of their disposition to fatten after the operation.

3. It is with a view to the solubility, that we make a choice between meats recently killed, and those which have been kept for some time. As soon as meat is killed, the putrefactive process begins; which commonly we allow to proceed for a little, as that process is the most effectual breaker down of animal matters, and a great assistance to solution. The length of time during which meat ought to be kept, is proportioned to the meat's tendency to undergo the putrid fermentation, and the degree of those circumstances which favour it: Thus, in the torrid zone, where meat cannot be kept above four or five hours, it is used much more recent than in these northern climates.

4. *Boiled* or *roasted* meats create a difference of solution. By boiling we extract the juices interposed between the fibres, approximate them more to each other, and render them of more difficult solubility; which is increased too by the extraction of the juices, which are much more alkalescent than the fibres: but when we want to avoid the stimulus of alkalescent food, and the quick solution, as in some cases of disease, the roasted is not to be chosen. Of roasted meat it may be asked, which are more proper, those which are most or least roasted? That which is least done is certainly the most soluble: even raw meats are more soluble than dressed, as Dr Cullen was informed by a person who from necessity was obliged, for some time, to eat such. But at the same time that meats little done are very soluble, they are very alkalescent; so that, wherever we want to avoid alkalescency in the *prime via*, the most roasted meats should be chosen. Those who throw away the broths of boiled meat do very improperly; for, besides their supplying a fluid, from their greater alkalescency they increase the solubility of the meat. Here we shall observe, that pure blood has been thought insoluble. Undoubtedly it is very nutritious; and though out of the body, like the white of eggs, it seems very insoluble, yet, like that too, in the body it is commonly easily digested. Moses very properly forbid it the Israelites, as in warm countries it is highly alkalescent; and even here, when it was used in great quantity, the scurvy was

* See the article Bread.

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more frequent : but to a moderate use of it, in these climates, no such objection takes place.

5. Solubility is varied from another source, *viz.* viscosity of the juice of aliment. Young animals, then, appear more soluble than old, not only on account of the compaction and firmness of texture in the latter, but also their greater viscosity of juice. And nothing is more common, than to be longer oppressed from a full meal of veal, than from the same quantity of beef, &c. Upon account, too, of their greater viscosity of juice, are the tendinous and ligamentous parts of animals longer retained than the purely muscular, as well as on account of their firmness of texture. Even fishes, whose muscular parts are exceedingly tender, are, on account of their gluey viscosity, longer of solution in the stomach. And eggs, too, which are exceedingly nourishing, have the same effect, and cannot be taken in great quantity : For the stomach is peculiarly sensible to gelatinous substances ; and by this means has nature perhaps taught us, as it were by a sort of instinct, to limit ourselves in the quantity of such nutritive substances.

6. With regard to solution, we must take in the oils of animal food ; which, when tolerably pure, are the least putrescent part of it, and, by diminishing the cohesion of the fibres, render them more soluble. On this last account is the lean of fat meat more easily dissolved than other lean. But when the meat is exposed to much heat, this oil is separated, leaving the solid parts less easily soluble, and becoming itself empyreumatic, rancid, and of difficult mixture in the stomach. Fried meats, from the reasons now given, and baked meats, for the same, as well as for the tenacity of the paste, are preparations which diminish the solubility of the food. From what has been said, the preparation of food by fattening it, and keeping it for some time after killed, although it may administer to gluttony, will yet, it must be confessed, increase the solution of the food.

II. The second difference of animal-food is with regard to ALKALESCENCY.

Of this we have taken a little notice already under the head of *Solubility*.

1. From their too great alkalescency we commonly avoid the carnivorous animals, and the *fera* ; and choose rather the granivorous. Some birds, indeed, which live on insects, are admitted into our food ; but no man, without *nausea*, can live upon these alone for any length of time. Fishes, too, are an exception to this rule, living almost universally on each other. But in these the alkalescency does not proceed so far ; whether from the viscosity of their juice, their want of heat, or some peculiarity in their economy, is not easy to determine.

2. Alkalescency is determined by difference of age. The older animals are always more alkalescent than the young, from their continual progress to putrefaction. Homberg always found, in his endeavours to extract an acid from human blood, that more was obtained from the young than from the old animals.

3. A third circumstance which varies the alkalescency of the food, is the wildness or tameness of the animal ; and this again seems to depend on its exercise. Dr Cullen knew a gentleman who was fond of cats for food : but he always used to feed them on vegetable

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food, and kept them from exercise ; and in the same manner did the Romans rear up their rats, when intended for food. In the same way the flesh of the partridge and the hen seems to be much the same ; only, from its being more on the wing, the one is more alkalescent than the other. Again, tame animals are commonly used without their blood ; whereas the wild are commonly killed in their blood, and upon that account, as well as their greater exercise, are more alkalescent.

4. The alkalescency of food may be determined from the quantity of volatile salt it affords. The older the meat is, it is found to give the greater proportion of volatile salt.

5. The alkalescency of aliment may also, in some measure, be determined from its colour, the younger animals being whiter and less alkalescent. We also take a mark from the colour of the gravy poured out, according to the redness of the juices judging of the animal's alkalescency.

6. The relish of food is found to depend much on its alkalescency, as does also the stimulus it gives and the fever it produces in the system. These effects are also complicated with the viscosity of the food, by which means it is longer detained in the stomach, and the want of alkalescency supplied.

Having mentioned animal food as differing in solubility and alkalescency, which often go together in the same subject, we come to the third difference, *viz.*

III. QUANTITY of Nutriment. Which is either absolute or relative : absolute with respect to the quantity it really contains, sufficient powers being given to extract it ; relative, with respect to the assimilatory powers of those who use it. The absolute nutriment is of some consequence ; but the relative, in the robust and healthy, and except in cases of extraordinary weakness, may, without much inconvenience, be disregarded. In another case is the quantity of nourishment relative, *viz.* with regard to its *perspirability* ; for if the food is soon carried off by the excretions, it is the same thing as if it contained a less proportion of nourishment. For, giving more fluid, that which is longer retained affords most ; and, for the repair of the solids, that retention also is of advantage. Now, gelatinous substances are long retained ; and besides, are themselves animal substances dissolved : so that, both absolutely and relatively, such substances are nutritious. Of this kind are eggs, shell-fish, &c. In adults, though it is disputed whether their solids need any repair, yet, at any rate, at this period, fluid is more required ; for this purpose the alkalescent foods are most proper, being most easily dissolved. They are, at the same time, the most perspirable ; on one hand that alkalescency leading to disease, while on the other their perspirability obviates it. Adults, therefore, as writers justly observe, are better nourished on the alkalescent ; the young and growing, on gelatinous foods. All this leads to a comparison of young and old meats ; the first being more gelatinous, and the last more alkalescent. This, however, by experience, is not yet properly ascertained. Mr Geoffroy is the only person who has been taken up with the analysis of foods. See *Memoires de l'Academie*, l'an. 1731 & 1732. His attempt was certainly laudable, and in some respects usefully performed ; but, in general, his experiments,

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ments were not sufficiently repeated, nor are indeed sufficiently accurate. He has not been on his guard against the various circumstances which affect meats; the cow-kind liking a moist succulent herbage, which is not to be got in warm climates; while the sheep are fond of a dry food, and thrive best there. Again, some of his experiments seem contradictory. He says, that veal gives more solution than beef, while lamb gives less than mutton, which is much to be doubted. If both he and Sanctorius had examined English beef, the result probably would have been very different as to its perspirability, &c. Besides, Mr Geoffroy has only analysed beef and veal when raw; has made no proper circumstantial comparisons between quadrupeds and birds; and has examined these last along with their bones, and not their muscles, &c. by themselves, as he ought to have done, &c. If a set of experiments of this kind were properly and accurately performed, they might be of great use; but, at present, for the purpose of determining our present subject, we must have recourse to our alkalescency, solubility, &c.

IV. The fourth difference of animal foods is, *The Nature of the Fluids they afford*. The whole of this will be understood from what has been said on alkalescency; the fluid produced being more or less dense and stimulating, in proportion as that prevails.

V. The fifth difference of animal-foods is with respect to their

PERSPIRABILITY. The sum of what can be said on this matter is this, that such foods as promote an accumulation of fluid in our vessels, and dispose to plethora, are the least perspirable, and commonly give most strength; that the more alkalescent foods are the most perspirable, though the viscid and less alkalescent may attain the same property by long retention in the system. The authors on perspirability have determined the perspiration of foods as imperfectly as Mr Geoffroy has done the solubility, and in a few cases only. We must not lay hold on what Sanctorius has said on the perspirability of mutton, because he has not examined in the same way other meats in their perfect state; far less on what Keil says of oysters, as he himself was a valetudinarian, and consequently an unfit subject for such experiments, and probably of a peculiar temperament.

As to the effects of Food on the MIND, we have already hinted at them above. It is plain, that delicacy of feeling, liveliness of imagination, quickness of apprehension, and acuteness of judgment, more frequently accompany a weak state of the body. True it is, indeed, that the same state is liable to timidity, fluctuation, and doubt; while the strong have that steadiness of judgment, and firmness of purpose, which are proper for the higher and more active scenes of life. The most valuable state of the mind, however, appears to reside in somewhat less firmness and vigour of body. Vegetable aliment, as never over-distending the vessels or loading the system, never interrupts the stronger motions of the mind; while the heat, fulness, and weight, of animal food, are an enemy to its vigorous efforts. Temperance, then, does not so much consist in the quantity, for that always will be regulated by our appetite, as in the quality, viz. a large proportion of vegetable aliment.

A considerable change has now taken place in the

articles made use of as food by the ancients, by substituting, instead of what were then used, particularly of the vegetable kind, a number of more bland, agreeable, and nutritive juices. The acorns and nuts of the primitive times have given way to a variety of sweeter farinaceous seeds and roots. To the malvaceous tribe of plants so much used by the Greeks and Romans, hath succeeded the more grateful spinach; and to the blite, the garden orach. The rough borage is supplanted by the acescent sorrel; and asparagus has banished a number of roots recorded by the Roman writers under the name of *bulbs*; but Linnæus is of opinion, that the parsnip has undeservedly usurped the place of the skirret. The bean of the ancients, improperly so called, being the roots as well as other parts of the *nymphaea nelumbo*, or Indian water-lily, is superseded by the kidney-bean. The garden rocket, eaten with and as an antidote against the chilling qualities of the lettuce, is banished by the more agreeable cress and tarragon; the apium by the meliorated celery; the pompion, and others of the cucurbitaceous tribe, by the melon; and the sumach berries, by the fragrant nutmeg. The silphium, or succus Cyrenæicus, which the Romans purchased from Persia and India at a great price, and is thought by some to have been the asafetida of the present time, is no longer used in preference to the alliaceous tribe.

To turn from the vegetable to some of the animal substitutes, we may mention the carp among fishes as having excluded a great number held in high estimation among the Romans. The change of oil for butter; of honey for sugar; of mulsa, or liquors made of wine, water, and honey, for the wines of modern times; and that of the ancient zythus for the present improved malt liquors; not to mention also the *callida* of the Roman taverns, analogous to our tea and coffee.

Food of Plants. See AGRICULTURE, n° 1—6. and PLANTS; also the article COMPOSTS.

FOOL, according to Mr Locke, is a person who makes false conclusions from right principles; whereas a madman, on the contrary, draws right conclusions from wrong principles. See FOLLY.

Fool-Stones, in botany. See ORCHIS.

FOOSHT, an island in the Red Sea; situated, according to the observations of Mr Bruce, in N. Lat. 15° 59' 43". It is described by him as about five miles in length from north to south, though only nine in circumference. It is low and sandy in the southern part, but the north rises in a black hill of inconsiderable height. It is covered with a kind of bent-grass, which never arrives at any great length by reason of want of rain and the constant browsing of the goats. There are great appearances of the black hill having once been a volcano; and near the north cape the ground sounds hollow like the Solfaterra in Italy. There are a vast number of beautiful fish met with upon the coasts, but few fit for eating; and our traveller observed, that the most beautiful were the most noxious when eaten; none, indeed, being salutary food excepting those which resembled the fish of the northern seas. There are many beautiful shell-fish, as the concha veneris, of several colours and sizes; sea-urchins, &c. Spunges are likewise found all along the coast. There are also pearls, but neither large nor of a good water; in consequence of which they sell at no great price. They are produced by a species of bivalve shells. Several

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veral large shells, from the fish named *biffer*, are met with upon stones of ten or twelve tons weight along the coast. They are tumbled upon their faces and sunk into the stones, as into a paste, the stone being raised all about them in such a manner as to cover the edge of the shell; "a proof (says Mr Bruce) that this stone must some time lately have been soft or liquefied: for had it been long ago, the sun and air would have worn the surface of the shell; but it seems perfectly entire, and is set in that hard brown rock as the stone of a ring is in a golden chafing."—The water in this island is very good.

The inhabitants of Footst are poor fishermen of a swarthy colour; going naked, excepting only a rag about their waist. They have no bread but what they procure in exchange for the fish they catch. What they barter in this manner is called *seajan*. But besides this they catch another species, which is flat, with a long tail, and the skin made use of for shagreen, of which the handles of knives and swords are made. There is a small town on the island, consisting of about 30 huts, built with faggots of bent grass or spartum, supported by a few sticks, and thatched with grass of the same kind of which they are built.

FOOT, a part of the body of most animals whereon the stand, walk, &c. See ANATOMY, n° 63.

Foot, in the Latin and Greek poetry, a metre or measure, composed of a certain number of long and short syllables.

These feet are commonly reckoned 28: of which some are simple, as consisting of two or three syllables, and therefore called *disyllabic* or *trisyllabic feet*; others are compound, consisting of four syllables, and are therefore called *tetrasyllabic feet*.

The disyllabic feet are four in number, *viz.* the pyrrhichius, iambus, trocheus, and anapaestus. See PYRRHICHIVS, &c.

The trisyllabic feet are eight in number, *viz.* the dactylus, anapaestus, tribrachys, molossus, amphibrachys, amphimacer, bacchius, and antibacchius. See DACTYL, &c.

The tetrasyllabic are in number 16, *viz.* the proclimaticus, dispondeus, choriambus, antispastus, diambus, dichoreus, ionicus a majore, ionicus a minore, epiritus primus, epiritus secundus, epiritus tertius, epiritus quartus, pæon primus, pæon secundus, pæon tertius, and pæon quartus. See PROCLIMATICUS, &c.

Foot is also a long measure consisting of 12 inches.

Geometricians divide the foot into 10 digits, and the digit into 10 lines.

Foot-Hak, the name of a particular disorder incident to sheep. It takes its source from an insect, which, when it comes to a certain maturity, resembles a worm of two, three, or four inches in length. The first appearance of the malady is, when the sheep gives signs of being lame, which increases to so high a degree as to prevent grazing; when, what with want of sufficient food and pain, the poor animal suffers greatly, and lingers till it dies a natural death, if not properly attended to, by extracting the insect or worm; the sooner the better, as it is very easily performed.

As soon as the lameness is perceived, let the foot that is lame be examined between the clove of the

claws, and it will be found that in the skin where the clove separates is a small hole (not natural), through which the insect, when yet small, gets its entrance, and by degrees has worked itself upwards along the leg, between the outward skin and bone, and obtains its largest magnitude. Proportionally it finds its nourishment, and is left undisturbed. This worm must be extracted by moving the claws backward and forward in contrary directions; and it will not be long before the under part of the worm makes its appearance at the above mentioned small hole, and continuing the same operation of moving the claws, the whole worm will work itself out; which is better than when at its first appearance it should be drawn out with danger of breaking off, and part of it should remain in the sheep's leg, and by its rotting there may be hurtful. This easy and simple operation will be found effectual without any other kind of application whatever, nature herself curing the channel which the worm had made along the leg.

It is observed, this malady is in some years more prevalent than in others, particularly in wet seasons than in drier; more observed to begin in spring and autumn than in summer and winter; notwithstanding, what with snow, &c. sheep suffer more by the wet in winter than in any of the other seasons (possibly it is not then the season for this sort of insect). In high healthy grounds, the sheep are less liable to it than in low marshy and meadow grounds: from all which circumstances it may be supposed, that this insect, in its first state, has for its most natural element either the earth, water, or air; and only gets accidentally between the clove of the claws of the sheep, and finds there what is sufficient for its nourishment and security.

Foot Square, is the same measure both in breadth and length, containing 144 square or superficial inches.

Cubic or Solid Foot, is the same measure in all the three dimensions, length, breadth, and depth or thickness, containing 1728 cubic inches.

Foot of a Horse, in the manege, the extremity of the leg, from the coronet to the lower part of the hoof.

Foot-Level, among artificers, an instrument that serves as a foot-rule, a square, and a level. See LEVEL, RULE, and SQUARE.

FOOTE (Samuel, Esq.), the modern Aristophanes, was born at Truro, in Cornwall; and was descended from a very ancient family. His father was member of parliament for Tiverton, in Devonshire; and enjoyed the post of commissioner of the prize-office and fine-contraband. His mother was heiress of the Dinely and Goodere families. In consequence of a fatal misunderstanding between her two brothers, Sir John Dinely Goodere, Bart. and Samuel Goodere, Esq. captain of his majesty's ship the Ruby, which ended in the death of both, a considerable part of the Goodere estate, which was better than 5000 l. *per annum*, descended to Mr Foote.

He was educated at Worcester college, Oxford, which owed its foundation to Sir Thomas Cookes Winford, Bart. a second cousin of our author's. On leaving the university, he commenced student of law in the Temple; but as the dryness of this study did not suit the liveliness of his genius, he soon relinquished it. He

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He married a young lady of a good family and some fortune; but their tempers not agreeing, a perfect harmony did not long subsist between them. He now lanced into all the fashionable foibles of the age, gaming not excepted; and in a few years spent his whole fortune. His necessities led him to the stage, and he made his first appearance in the character of Othello. He next performed Fondlewife with much more applause; and this, indeed, was ever after one of his capital parts. He attempted Lord Foppington likewise, but prudently gave it up. But as Mr Foote was never a capital actor in the plays of others, his salary was very unequal to his gay and extravagant turn; and he contracted debts which forced him to take refuge within the verge of the court. On this occasion, he relieved his necessities by the following stratagem. Sir Francis D—l—l had long been his intimate friend, and had dissipated his fortune by similar extravagance. Lady N—u P—l—t, who was likewise an intimate acquaintance of Foote's, and who was exceeding rich, was fortunately at that time bent upon a matrimonial scheme. Foote strongly recommended to her to consult upon this momentous affair the conjurer in the Old Bailey, whom he represented as a man of surprising skill and penetration. He employed an acquaintance of his own to personate the conjurer; who depicted Sir Francis D—l—l at full length; described the time when, the place where, and the dress in which she would see him. The lady was so struck with the coincidence of every circumstance, that she married D—l—l in a few days. For this service Sir Francis settled an annuity upon Foote; and this enabled him once more to emerge from obscurity.

In 1747 he opened the little theatre in the Haymarket, taking upon himself the double character of author and performer; and appeared in a dramatic piece of his own composing, called the *Diversions of the Morning*. This piece consisted of nothing more than the exhibition of several characters well known in real life; whose manner of conversation and expression this author very happily hit off in the diction of his drama, and still more happily represented on the stage, by an exact and most amazing imitation, not only of the manner and tone of voice, but even of the very persons, of those whom he intended to take off. In this performance, a certain physician, Dr L—n, well known for the oddity and singularity of his appearance and conversation, and the celebrated Chevalier Taylor, who was at that time in the height of his popularity, were made objects of Foote's ridicule; the latter, indeed, very deservedly; and, in the concluding part of his speech, under the character of a theatrical director, Mr Foote took off, with great humour and accuracy, the several styles of acting of every principal performer on the English stage. This performance at first met with some opposition from the civil magistrates of Westminster, under the sanction of the act of parliament for limiting the number of playhouses, as well as from the jealousy of one of the managers of Drury-lane playhouse; but the author being patronized by many of the principal nobility, and other persons of distinction, this opposition was over-ruled: and having altered the title of his performance, Mr Foote proceeded, without further molestation, to give *Tea in a Morning* to his friends, and represented it through a run of

40 mornings to crowded and splendid audiences.—The ensuing season he produced another piece of the same kind, which he called *An Auction of Pictures*. In this performance he introduced several new and popular characters; particularly Sir Thomas de Veil, then the acting justice of peace for Westminster, Mr Cock the celebrated auctioneer, and the equally famous orator Henley. This piece also had a very great run.—His *Knights*, which was the produce of the ensuing season, was a performance of somewhat more dramatic regularity: but still, although his plot and characters seemed less immediately personal, it was apparent that he kept some particular real persons strongly in his eye in the performance; and the town took upon themselves to fix them where the resemblance appeared to be the most striking.—Thus Mr Foote continued from time to time to select, for the entertainment of the public, such characters, as well general as individual, as seemed most likely to engage their attention. His dramatic pieces, exclusive of the interlude called *Piety in Patten's*, are as follow: *Taste*, *The Knights*, *The Author*, *The Englishman in Paris*, *The Englishman returned from Paris*, *The Mayor of Garrat*, *The Liar*, *The Patron*, *The Minor*, *The Orators*, *The Commissary*, *The Devil upon Two Sticks*, *The Lame Lover*, *The Maid of Bath*, *The Nabob*, *The Cozeners*, *The Capuchin*, *The Bankrupt*, and an unfinished comedy called *The Slanderer*.—All these works are only to be ranked among the *petites pieces* of the theatre. In the execution they are somewhat loose, negligent, and unfinished; the plots are often irregular, and the catastrophes not always conclusive: but, with all these deficiencies, they contain more strength of character, more strokes of keen satire, and more touches of temporary humour, than are to be found in the writings of any other modern dramatist. Even the language spoken by his characters, incorrect as it may sometimes seem, will on a closer examination be found entirely dramatical; as it abounds with those natural minutiae of expression which frequently form the very basis of character, and which render it the truest mirror of the conversation of the times in which he wrote.

In the year 1766, being on a party of pleasure with the late duke of York, lord Mexborough, and Sir Francis Delaval, Mr Foote had the misfortune to break his leg, by a fall from his horse; in consequence of which, he was compelled to undergo an amputation. This accident so sensibly affected the duke, that he made a point of obtaining for Mr Foote a patent for life; whereby he was allowed to perform, at the little theatre in the Haymarket, from the 15th of May to the 15th of September every year.

He now became a greater favourite of the town than ever: his very laughable pieces, with his more laughable performance, constantly filled his house; and his receipts were some seasons almost incredible. Parsimony was never a vice to be ascribed to Mr Foote; his hospitality and generosity were ever conspicuous; he was visited by the first nobility, and he was sometimes honoured even by royal guests.

The attack made upon his character by one of his domestics, whom he had dismissed for misbehaviour, is too well known to be particularized here. Suffice it to say, he was honourably acquitted of that charge: but it is believed by some, that the shock which he received

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ceived from it accelerated his death; others pretend, that his literary altercation with a certain *then* duchess, or rather her agents, much affected him, and that from that time his health declined. It is probable, however, that his natural volatility of spirits could scarcely fail to support him against all impressions from either of these quarters.

Mr Foote, finding his health decline, entered into an agreement with Mr Colman, for his patent of the theatre; according to which, he was to receive from Mr Colman L. 1600 *per annum*, besides a stipulated sum whenever he chose to perform. Mr Foote made his appearance two or three times in some of the most admired characters; but being suddenly affected with a paralytic stroke one night whilst upon the stage, he was compelled to retire. He was advised to bathe; and accordingly repaired to Brightelmstone, where he apparently recovered his former health and spirits, and was what is called the *fiddle of the company* who resorted to that agreeable place of amusement. A few weeks before his death, he returned to London; but, by the advice of his physicians, set out with an intention to spend the winter at Paris and in the south of France. He had got no farther than Dover, when he was suddenly attacked by another stroke of the palsy, which in a few hours terminated his existence. He died on the 21st of October 1777, in the 56th year of his age, and was privately interred in the cloisters of Westminster abbey.

FOP, probably derived from the *vappa* of Horace, applied in the first satire of his first book to the wild and extravagant Nævius, is used among us to denote a person who cultivates a regard to adventitious ornament and beauty to excess.

FORAMEN, in anatomy, a name given to several apertures or perforations in divers parts of the body; as, 1. The external and internal foramina of the cranium or skull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani.

FORAMEN Ovale, an oval aperture or passage through the heart of a fœtus, which closes up after birth. It arises from the coronal vein, near the right auricle, and passes directly into the left auricle of the heart, serving for the circulation of the blood in the fœtus, till such time as the infant breathes, and the lungs are open; it being generally reckoned one of the temporary parts of the fœtus, wherein it differs from an adult; although almost all anatomists, Mr Cheselden excepted, assure us, that the foramen ovale has sometimes been found in adults. See FORUS.

FORBES (Patrick), bishop of Aberdeen, was born in 1654, when the affairs of the church of Scotland were in much confusion; to the settlement of which he greatly contributed. As chancellor of the university of Aberdeen, he improved that seat of learning by repairing the fabric, augmenting the library, and reviving the professorships. He published a *Commentary on the Revelations*, at London, in 1613; and died in 1635.

FORBES (John), the son of Patrick, but of much more extensive learning than his father, was perhaps excelled by none of his age, which will be allowed by those who read his *Historical and Theological Institutes*. He was bishop of Aberdeen; but was expelled by the

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Covenanters, and forced to fly beyond sea. He continued in Holland two years; and, upon his return, lived private on his estate at Corse, until he died in 1648. An edition of all his works was printed in two vols folio at Amsterdam in 1703.

FORBES (William), a learned bishop of Edinburgh, born in 1585. His ill-health and the anti-episcopal disposition of the Scots, confined him chiefly to a retired life: but when Charles I. in 1633, founded an episcopal church at Edinburgh, he thought none more worthy to fill the see than Mr Forbes; who, however, died three months after his consecration, in 1634. Though very able and learned, he published nothing; but wrote a treatise to pacify controversies, which was printed at London 24 years after his death.

FORBES (Duncan, Esq; of Culloden), was born in the year 1685. In his early life, he was brought up in a family remarkable for hospitality; which, perhaps, led him afterwards to a freer indulgence in social pleasures. His natural disposition inclined him to the army: but, as he soon discovered a superior genius, by the advice of his friends he applied himself to letters. He directed his studies particularly to the civil law; in which he made a quick progress, and in 1709 was admitted an advocate. From 1722 to 1737, he represented in parliament the boroughs of Inverness, Fortrose, Nairn, and Forres. In 1725, he was made king's advocate; and Lord President of the Court of Session in 1737. In the troubles of 1715 and 1745 he espoused the royal cause; but with so much prudence and moderation did he conduct himself at this delicate conjuncture, that not a whisper was at any time heard to his prejudice. The glory he acquired in advancing the prosperity of his country, and in contributing to re-establish peace and order, was the only reward of his services. He had even impaired, and almost ruined, his private fortune in the cause of the public; but government did not make him the smallest recompense. The minister, with a meanness for which it is difficult to account, desired to have a state of his disbursements. He was so much shocked at the rudeness of this treatment, that he left the minister without making any reply. Throughout the whole course of his life he had a lively sense of religion, without the least taint of superstition; and his charity was extended to every sect and denomination of religionists indiscriminately. He was well versed in the Hebrew language; and wrote, in a flowing and oratorical style, concerning religion natural and revealed, some important discoveries in theology and philosophy, and concerning the sources of incredulity. He died in 1747, in the 62d year of his age; and his works have since been published in two volumes octavo.

FORCE, in philosophy, denotes the cause of the change in the state of a body, when, being at rest, it begins to move, or has a motion which is either not uniform or not direct. While a body remains in the same state, either of rest or of uniform and rectilinear motion, the cause of its remaining in such a state is, in the nature of the body, and it cannot be said that any extrinsic force has acted on it. This internal cause or principle is called *inertia*.

Mechanical forces may be reduced to two sorts; one of a body at rest, the other of a body in motion.

Force.

The force of a body at rest, is that which we conceive to be in a body lying still on a table, or hanging by a rope, or supported by a spring, &c. and this is called by the names of *pressure, tension, force, or vis mortua, sollicitatio, conatus movendi, conamen*, &c. To this class also of forces we must refer centripetal and centrifugal forces, though they reside in a body in motion; because these forces are homogeneous to weights, pressures, or tensions of any kind.

The force of a body in motion is a power residing in that body so long as it continues its motion; by means of which it is able to remove obstacles lying in its way; to lessen, destroy, or overcome the force of any other moving body, which meets it in an opposite direction; or to surmount any dead pressure or resistance, as tension, gravity, friction, &c. for some time; but which will be lessened or destroyed by such resistance as lessens or destroys the motion of the body. This is called *moving force, vis motrix*, and by some late writers *vis viva*, to distinguish it from the *vis mortua* spoken of before; and by these appellations, however different, the same thing is understood by all mathematicians; namely, that power of displacing, of withstanding opposite moving forces, or of overcoming any dead resistance, which resides in a moving body, and which, in whole or in part, continues to accompany it, so long as the body moves. See MECHANICS.

We have several curious as well as useful observations in Defagulier's Experimental Philosophy, concerning the comparative forces of men and horses, and the best way of applying them. A horse draws with the greatest advantage when the line of direction is level with his breast; in such a situation, he is able to draw 200 lb. eight hours a-day, walking about two miles and an half an hour. And if the same horse is made to draw 240 lb. he can work but six hours a-day, and cannot go quite so fast. On a carriage, indeed, where friction alone is to be overcome, a middling horse will draw 1000 lb. But the best way to try a horse's force, is by making him draw up out of a well, over a single pulley or roller; and in such a case, one horse with another will draw 200 lb. as already observed.

Five men are found to be equal in strength to one horse, and can, with as much ease, push round the horizontal beam of a mill, in a walk 40 feet wide; whereas three men will do it in a walk only 19 feet wide.

The worst way of applying the force of a horse, is to make him carry or draw up hill: for if the hill be steep, three men will do more than a horse, each man climbing up faster with a burden of 100 lb. weight, than a horse that is loaded with 300 lb. a difference which is owing to the position of the parts of the human body being better adapted to climb than those of a horse.

On the other hand, the best way of applying the force of a horse, is an horizontal direction, wherein a man can exert least force: thus a man, weighing 140 lb. and drawing a boat along by means of a rope coming over his shoulders, cannot draw above 27 lb. or exert above one-seventh part of the force of a horse employed to the same purpose.

The very best and most effectual posture in a man,

is that of rowing; wherein he not only acts with more muscles at once for overcoming the resistance, than in any other position; but as he pulls backwards, the weight of his body assists by way of lever. See Defaguliers, Exp. Phil. vol. i. p. 241. where we have several other observations relative to force acquired by certain positions of the body, from which that author accounts for most feats of strength and activity. See also a *Memoire* on this subject by M. de la Hire, in Mem. Roy. Acad. Sc. 1629; or in Defaguliers, Exp. &c. p. 267, &c. who has published a translation of part of it with remarks.

FORCE, in law, signifies any unlawful violence offered to things or persons, and is divided into simple and compound. *Simple force* is what is so committed, that it has no other crime attending it; as where a person by force enters on another's possession, without committing any other unlawful act. *Compound force*, is where some other violence is committed with such an act which of itself alone is criminal; as if one enters by force into another's house, and there kills a person, or ravishes a woman. There is likewise a force implied in law, as in every trespass, rescue, or disseisin, and an actual force with weapons, number of persons, &c.—Any person may lawfully enter a tavern, inn, or victualling-house; so may a landlord his tenant's house to view repairs, &c. But if, in these cases, the person that enters commits any violence or force, the law will intend that he entered for that purpose.

FORCEPS, in surgery, &c. a pair of scissors for cutting off, or dividing, the fleshy membranous parts of the body, as occasion requires. See SURGERY.

FORCIBLE ENTRY, is a violent and actual entry into houses or lands; and a forcible detainer, is where one by violence with-holds the possession of lands, &c. so that the person who has a right of entry is barred, or hindered, therefrom.

At common law, any person that had a right to enter into lands, &c. might retain possession of it by force. But this liberty being abused, to the breach of the peace, it was therefore found necessary that the same should be restrained: Though, at this day, he who is wrongfully dispossessed of goods may by force retake them. By statute, no persons shall make an entry on any lands or tenements, except where it is given by law, and in a peaceable manner, even tho' they have title of entry, on pain of imprisonment: and where a forcible entry is committed, justices of peace are authorized to view the place, and enquire of the force by a jury, summoned by the sheriff of the county; and they may cause the tenements, &c. to be restored, and imprison the offenders till they pay a fine. Likewise a writ of forcible entry lies, where a person seized of freehold, is by force put out thereof.

FORCIBLE Marriage, of a woman of estate, is felony. For by the statute 3 H. 7. c. 2. it is enacted, "That ^{Jacob's} if any persons shall take away any woman having lands ^{Law Dist.} or goods, or that is heir-apparent to her ancestor, by force, and against her will, and marry or defile her; the takers, procurers, abettors, and receivers, of the woman taken away against her will, and knowing the same, shall be deemed principal felons; but as to procurers and accessories, they are, before the offence be committed, to be excluded the benefit of clergy, by

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39 Eliz. c. 9. The indictment on the statute 3 H. 7, is expressly to set forth, that the woman taken away had lands or goods, or was heir apparent; and also that she was married or defiled, because no other case is within the statute; and it ought to allege that the taking was for lucre. It is no excuse that the woman at first was taken away with her consent: for if she afterwards refuse to continue with the offender, and be forced against her will, she may from that time properly be said to be taken against her will; and it is not material whether a woman so taken away be at last married or defiled with her own consent or not, if she were under force at the time; the offender being in both cases equally within the words of the act.

Those persons who, after the fact, receive the offender, are but accessories after the offence, according to the rules of common law; and those that are only privy to the damage, but not parties to the forcible taking away, are not within the act, H. P. C. 119.

A man may be indicted for taking away a woman by force in another country; for the continuing of the force in any country, amounts to a forcible taking there. *Ibid.* Taking away any woman-child under the age of 16 years and unmarried, out of the custody and without the consent of the father or guardian, &c. the offender shall suffer fine and imprisonment; and if the woman agrees to any contract of matrimony with such person, she shall forfeit her estate during life, to the next of kin to whom the inheritance should descend, &c. Stat. 4 & 5. P & M. c. 8. This is a force against the parents: and an information will lie for seducing a young man or woman from their parents, against their consents, in order to marry them, &c. See MARRIAGE.

FORCING, in gardening, a method of producing ripe fruits from trees before their natural season. The method of doing it is this: A wall should be erected ten feet high; a border must be marked out on the south side of it, of about four feet wide, and some stakes must be fastened into the ground all along the edge of the border; these should be four inches thick. They are intended to rest the glass lights upon, which are to slope backwards to the wall, to shelter the fruit as there shall be occasion: and there must be, at each end, a door to open either way, according as the wind blows. The frame should be made moveable along the wall, that when a tree has been forced one year, the frame may be removed to another, and so on, that the trees may each of them be forced only once in three years, at which rate they will last a long time. They must be always well-grown trees that are chosen for forcing; for young ones are soon destroyed, and the fruit that is produced from them is never so well tasted. The fruits most proper for this management are the avant or small white nutmeg, the albemarle, the early newington, and the brown nutmeg peaches; Mr Fairchild's early, and the elrugo and newington nectarines; the masculine apricot, and the may-duke and may cherry. For grapes, the white and black sweet-water are the properest; and of gooseberries the Dutch white, the Dutch early green, and the walnut gooseberry; and the large Dutch white and large Dutch red currants.

The dung, before it is put to the wall, should be laid together in a heap for five or six days, that it may

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heat uniformly through; and when thus prepared it must be laid four feet thick at the base of the wall, and go sloping up till it is two feet thick at the top. It must be laid at least within three or four inches of the top of the wall; and when it sinks, as it will sink, two or three feet, more dung must be laid on; for the first heat will do little more than just swell the blossom-buds. The covering the trees with glasses is of great service; but they should be taken off to admit the benefit of gentle showers to the trees, and the doors at the ends should be either left entirely open, or one or both of them opened, and a mat hung before them, at once to let the air circulate and keep off the frosts.

The dung is never to be applied till towards the end of November; and three changes of it will be sufficient to ripen the cherries, which will be very fine in February. As to the apricots, grapes, nectarines, peaches, and plums, if the weather be milder, the glasses are to be opened to let in sunshine or gentle showers.

If a row or two of scarlet strawberries be planted at the back of the frame, they will ripen in February or the beginning of March; the vines will blossom in April, and the grapes will be ripe in June.

It should be carefully observed, not to place early and late ripening fruits together, because the heat necessary to force the late ones will be of great injury to the early ones after they have fruited.

The masculine apricot will be ripe in the beginning of April, the early nectarines will be ripe about the same time, and the forward sort of plums by the latter end of that month. Gooseberries will have fruit fit for tarts in January or February, and will ripen in March; and currants will have ripe fruit in April.

The trees need not be planted so distant at these walls as at others, for they do not shoot so freely as in the open air; nine feet asunder is sufficient. They should be pruned about three weeks before the heat is applied.

FORCING, in the wine trade, a term used by the wine-coopers for the fining down wines, and rendering them fit for immediate draught. The principal inconvenience of the common way of fining down the white-wines by isinglass, and the red by whites of eggs, is the slowness of the operation; these ingredients not performing their office in less than a week, or sometimes a fortnight, according as the weather proves favourable, cloudy or clear, windy or calm: this appears to be matter of constant observation. But the wine-merchant frequently requires a method that shall, with certainty, make the wines fit for tasting in a few hours. A method of this kind there is, but it is kept in a few hands a valuable secret. Perhaps it depends upon a prudent use of a tartarized spirit of wine, and the common forcing, as occasion is, along with gypsum, as the principal; all which are to be well stirred about in wine, for half an hour before it is suffered to rest.

FORDOUN (John of), the father of Scottish history, flourished in the reign of Alexander III. towards the end of the 13th century. But of his life there is nothing known with certainty, though there was not a monastery that possessed not copies of his work. The first five books of the history which bears

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his name were written by him: the rest were fabricated from materials left by him, and from new collections by different persons. A manuscript in vellum of this historian is in the library of the university of Edinburgh.

FORDWICH, a town of Kent, called in the Doomsday-Book "the little Borough of Fordwich," is a member of the port of Sandwich, and was anciently incorporated by the style of the Barons of the town of Fordwich, but more lately by the name of the mayor, jurats, and commonalty, who enjoy the same privileges as the cinque-ports. This place is famous for excellent trouts in its river Stour.

FORDYCE (David), an elegant and learned writer of the present age, was professor of philosophy in the Marischal-college, Aberdeen. He was originally designed for the ministry; to prepare himself for which was the whole aim of his ambition, and for a course of years the whole purpose of his studies. How well he was qualified to appear in that character, appears from his "Theodorus, a dialogue concerning the art of preaching." After having finished this work, he went abroad on his travels, in order to obtain fresh stores of knowledge: but after a successful tour through several parts of Europe, he was unfortunately cast away in a storm on the coast of Holland. Besides the above work, he wrote Dialogues on Education, 8vo, and a Treatise of Moral Philosophy published in the Preceptor. The third edition of his Theodorus was published in London, after his untimely death, by his brother the Rev. Mr James Fordyce, an eminent dissenting minister, in 1755.

FORE, applied to a ship, denotes all that part of a ship's frame and machinery which lies near the stem.

Fore and aft is used for the whole ship's length, or from end to end.

FORECASTLE of a *SHIP*, that part where the foremast stands. It is divided from the rest by a bulk-head.

FOREIGN, something extraneous, or that comes from abroad. The word is formed from the Latin *fores*, "doors;" or *foris*, "out of doors;" or *forum*, "market," &c.

Foreign minister, foreign prince, foreign goods, &c. are those belonging to other nations. See **MINISTER**, &c.

Foreign to the purpose, signifies a thing remote or impertinent.

FOREIGN, in the English law, is used in various significations. Thus,

FOREIGN Attachment, is an attachment of the goods of foreigners found within a city or liberty, for the satisfaction of some citizen to whom the foreigner is indebted; or it signifies an attachment of a foreigner's money in the hands of another person.

FOREIGN Kingdom, a kingdom under the dominion of a foreign prince.

At the instance of an ambassador or consul, any offender against the laws here may be sent for hither from a foreign kingdom to which he hath fled. And, where a stranger of Holland, or any foreign country, buys goods at London, for instance, and there gives a note under his hand for payment, and then goes away privately into Holland; in that case, the seller may have a certificate from the lord mayor, on

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the proof of the sale and delivery of such goods, whereupon a process will be executed on the party in Holland.

FOREIGN Opposer, or *Apposer*, an officer in the exchequer that opposes or makes a charge on all sheriffs, &c. of their green wax; that is to say, fines, issues, amerciaments, recognizances, &c.

FOREIGN Plea, signifies an objection to the judge of the court, by refusing him as incompetent, because the matter in question is not within his jurisdiction.

FOREIGN Seamen, serving two years on board British ships, whether of war, trade, or privateers, during the time of war, shall be deemed natural-born subjects.

FOREIGNER, the natural-born subject to some foreign prince.

Foreigners, though made denizens, or naturalized, are disabled to bear any office in government, to be of the privy-council, or members of parliament, &c. This is by the acts of the settlement of the crown. Such persons as are not freemen of a city or corporation, are also called *foreigners*, to distinguish them from the members of the same.

FOREJUDGER, in law, signifies a judgment whereby one is deprived or put by a thing in question.

To be *forejudged the court*, is where an officer or attorney of any court is expelled the same for malpractice, or for not appearing to an action on a bill filed against him, &c. And where an attorney of the common-pleas is sued, the plaintiff's attorney delivers the bill to one of the criers of the court, who calls the attorney defendant, and solemnly proclaims aloud, that, if he does not appear thereto, he will be forejudged: likewise a rule is given by the secondary for his appearance: and if the attorney appears not in four days, then the clerk of the warrants strikes such an attorney off the roll of attorneys; after which he becomes liable to be arrested like any other person: but where an attorney is forejudged, he may be restored on clearing himself from his contumacy, and making satisfaction to the plaintiff, &c.

FORELAND, or **FORENESS**, in navigation, a point of land jutting out into the sea.

North FORELAND, in the isle of Thanet, Kent, of which it is the N. E. point, is the promontory ascertained by act of parliament to be the most southern part of the port of London; which is thereby extended N. in a right line to the point called the Naze on the coast of Essex, and forms that properly called the Mouth of the Thames. A sea mark was erected here by the Trinity-House corporation at the public expence, which is a round brick-tower, near 80 feet high. The sea gains so much upon the land here by the winds at S. W. that within the memory of some that are living above 30 acres of land have been lost in one place. All vessels that pass on the south-side of this head-land are said to enter the Channel, which is the name for the narrow sea between England and France; and all the towns or harbours between London and this place, whether on the Kentish or Essex shore, are called members of the port of London.

South FORELAND, in Kent, a head of land forming the east point of the Kentish shore; and called *South*, in respect to its bearing from the other Foreland, which is about six miles to the north. Its situation

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is

Foreign
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Foreland.

Fore-locks
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Forest.

is of great security to the Downs, the road between both, which would be a very dangerous road for ships, did not this point break the sea off, that would otherwise come rolling up from the west to the Flats or bank of sands, which for three leagues together and at about a league or a league and a half from the shore run parallel with it, and are dry at low water; so that these two capes breaking all the force of the sea on the S. E. and S. W. make the Downs accounted a good road, except when the wind blows excessive hard from S. E. E. by N. or E. N. E. when ships in the Downs are driven from their anchors, and often run a-shore, or are forced on the sands, or into Sandwich bay or Ramsgate pier.

FORE-LOCKS, in the sea-language, little flat wedges made with iron, used at the ends of bolts, to keep them from flying out of their holes.

FORE-MAST of a SHIP, a large round piece of timber, placed in her fore-part or fore-castle, and carrying the fore-sail and fore-top-sail yards. Its length is usually $\frac{3}{4}$ of the main-mast, and the fore-top-gallant-mast is $\frac{1}{2}$ the length of the fore-top.

FOREMAST-Men, are those on board a ship that take in the top-sails, sling the yards, furl the sails, bowse, trice, and take their turn at the helm, &c.

FOREST, in geography, a huge wood; or, a large extent of ground covered with trees. The word is formed of the Latin *foresta*, which first occurs in the capitulars of Charlemagne, and which itself is derived from the German *frost*, signifying the same thing. Spelman derives it from the Latin *foris refat*, by reason forests are out of towns. Others derive *foresta* from *feris*, q. d. *Foresta, quoad sit tuta statio ferarum*, as being a safe station or abode for wild beasts.

The Caledonian and Hercynian forests are famous in history. The first was a celebrated retreat of the ancient Picts and Scots; The latter anciently occupied the greatest part of Europe; particularly Germany, Poland, Hungary, &c. In Cæsar's time it extended from the borders of Alsatia and Switzerland to Transylvania; and was computed 60 days journey long, and 9 broad: some parts or cantons thereof are still remaining.

The ancients adored forests, and imagined a great part of their gods to reside therein: temples were frequently built in the thickest forests; the gloom and silence whereof naturally inspire sentiments of devotion, and turn mens thoughts within themselves.

For the like reason, the Druids made forests the place of their residence, performed their sacrifices, instructed their youth, and gave laws therein.

FOREST, in law, is defined, by Manwood, a certain territory of woody grounds and fruitful pastures, privileged for wild beasts and fowls of forest, chase, and warren, to rest and abide under the protection of the king, for his princely delight; bounded with unremovable marks and meres, either known by matter of record or prescription; replenished with wild beasts of venery or chase, with great coverts of vert for the said beasts; for preservation and continuance whereof, the vert and venison, there are certain particular laws, privileges, and officers.

Forests are of such antiquity in England, that, excepting the New-Forest in Hampshire, erected by William the Conqueror, and Hampton Court, erected by

Henry VIII it is said, that there is no record or history which makes any certain mention of their erection, though they are mentioned by several writers and in several of our laws and statutes. Ancient historians tell us, "that New-forest was raised by the destruction of 22 parish-churches, and many villages, chapels, and manors, for the space of 30 miles together, which was attended with divers judgments on the posterity of William I. who erected it: for William Rufus was there shot with an arrow, and before him Richard the brother of Henry I.; and Henry nephew to Robert, the eldest son of the Conqueror, did hang by the hair of the head in the boughs of the forest, like unto Ab-salom." *Blount*.

Besides the New-forest, there are 68 other forests in England, 13 chases, and more than 700 parks: the four principal forests are New-forest on the sea, Shirewood-forest on the Trent, Dean-forest on the Severn, and Windsor-forest on the Thames.

A forest in the hands of a subject is properly the same thing with a CHASE; being subject to the common law, and not to the forest-laws. But a chase differs from a forest, in that it is not inclosed; and likewise, that a man may have a chase in another man's ground as well as his own; being indeed the liberty of keeping beasts of chase, or royal game therein, protected even from the owner of the land, with a power of hunting them thereon. See PARK.

The manner of erecting a forest is thus: Certain commissioners are appointed under the great seal, who view the ground intended for a forest, and fence it round: this commission being returned into chancery, the king causeth it to be proclaimed throughout the county where the land lieth, that it is a forest; and prohibits all persons from hunting there, without his leave. Though the king may erect a forest on his own ground, and waste, he may not do it on the ground of other persons without their consent; and agreements with them for that purpose ought to be confirmed by parliament.

A forest, strictly taken, cannot be in the hands of any but the king; for no person but the king has power to grant a commission to be justice in eyre of the forest: yet, if he grants a forest to a subject, and that on request made in the chancery, that subject and his heirs shall have justices of the forest, in which case the subject has a forest in law.

A second property of a forest is, the courts thereof. See *FOREST-Courts*, *infra*.

A third property is the officers belonging to it, as the justices, warden, verderer, forester, agistor, regarder, keeper, bailiff, beadle, &c. See the articles AGISTOR, BAILIFF, FORESTER, &c.

By the laws of the forest, the receivers of trespasses in hunting, or killing of the deer, if they know them to be the king's property, are principal trespassers. Likewise, if a trespass be committed in a forest, and the trespasser dies, after his death, it may be punished in the life-time of the heir, contrary to common law. Our Norman kings punished such as killed deer in any of their forests with great severity; also in various manners; as by hanging, loss of limbs, gelding, and putting out eyes. By *magna charta de foresta*, it is ordained, that no person shall lose life or member for killing the king's deer in forests, but shall be fined; and

Forest.

Forest. if the offender has nothing to pay the fine, he shall be imprisoned a year and a day; and then be delivered, if he can give security not to offend for the future, &c. 9 Hen. III. c. 1.

Before this statute, it was felony to hunt the king's deer; and by a late act, persons armed and disguised, appearing in any forest, &c. if they hunt, kill, or steal any deer, &c. are guilty of felony. 9. Geo. I. c. 22.

He who has any licence to hunt in a forest or chase, &c. is to take care that he does not exceed his authority; otherwise he shall be deemed a trespasser from the beginning, and be punished for that fact, as if he had no licence. See further, the articles GAME, and Game-Law.

Beasts of the forest are, the hart, hind, buck, doe, boar, wolf, fox, hare, &c. The seasons for hunting whereof are as follow, viz. that of the hart and buck begins at the feast of St John Baptist, and ends at Holy-rod day; of the hind and doe, begins at Holy-rod, and continues till Candlemas; of the boar, from Christmas to Candlemas; of the fox begins at Christmas, and continues till Lady-day; of the hare at Michaelmas, and lasts till Candlemas.

FOREST-Courts, courts instituted for the government of the king's forests in different parts of the kingdom, and for the punishment of all injuries done to the king's deer or venison, to the vert or greenward, and to the covert in which such deer are lodged. These are the courts of ATTACHMENTS, of REGARD, of SWEINMOTE, and of JUSTICE-SEAT. 1. The court of attachments, woodmote, or forty-days court, is to be held before the verderors of the forest once in every forty days; and is instituted to inquire into all offenders against vert and venison: who may be attached by their bodies, if taken with the mainour (or *mainœuvre, à manu*) that is, in the very act of killing venison, or stealing wood, or in the preparing so to do, or by fresh and immediate pursuit after the act is done; else they must be attached by their goods. And in this forty-days court the foresters or keepers are to bring in the attachments, or presentments *de viridi et venatione*; and the verderors are to receive the same, and to enrol them, and to certify them under their seals to the court of justice-seat or sweinmote: for this court can only inquire of, but not convict, offenders. 2. The court of regard, or survey of dogs, is to be holden every third year for the lawing or expeditation of mastiffs; which is done by cutting off the claws of the fore-feet, to prevent them from running after deer. No other dogs but mastiffs are to be thus lawed or expeditated, for none other were permitted to be kept within the precincts of the forest; it being supposed that the keeping of these, and these only, was necessary for the defence of a man's house. 3. The court of sweinmote is to be holden before the verderors, as judges, by the steward of the sweinmote, thrice in every year; the sweins or freeholders within the forest composing the jury. The principal jurisdiction of this court is, first, to inquire into the oppressions and grievances committed by the officers of the forest; "*de super-oratione forestariorum, et aliorum ministrorum foresta; et de eorum oppressionibus populo regis illatis*:" and, secondly, to receive and try presentments certified from the court of attachments against offences in vert and venison. And this court may not only inquire, but convict also; which conviction shall be certified to the court of justice-seat un-

der the seals of the jury, for this court cannot proceed to judgment. But the principal court is, 4. The court of justice-seat, which is held before the chief justice in eyre, or chief itinerant judge, *capitalis justitarius in itinere*, or his deputy; to hear and determine all trespasses within the forest, and all claims of franchises, liberties, and privileges, and all pleas and causes whatsoever therein arising. It may also proceed to try presentments in the inferior courts of the forests, and to give judgment upon conviction of the sweinmote. And the chief justice may therefore, after presentment made or indictment found, but not before, issue his warrant to the officers of the forest to apprehend the offenders. It may be held every third year; and 40 days notice ought to be given of its sitting. This court may fine and imprison for offences within the forest, it being a court of record; and therefore a writ of error lies from hence to the court of king's-bench, to rectify and redress any mal-administrations of justice; or the chief justice in eyre may adjourn any matter of law into the court of king's-bench.

FOREST-Laws, are peculiar laws different from the common law of England. Before the making of *Charta de Foresta*, in the time of king John and his son Henry III. confirmed in parliament by 9 Henry III. offences committed therein were punished at the pleasure of the king in the severest manner. By this charter, many forests were disafforested and stripped of their oppressive privileges, and regulations were made for the government of those that remained; particularly, killing the king's deer was made no longer a capital offence, but only punished by fine, imprisonment, or abjuration of the realm: yet even in the charter there were some grievous articles, which the clemency of later princes have since by statute thought fit to alter *per assisas foresta*. And to this day, in trespasses relating to the forest, *voluntas reputabitur pro facto*; so that if a man be taken hunting a deer, he may be arrested as if he had taken a deer.

FOREST-Towns, in geography, certain towns of Suabia in Germany, lying along the Rhine, and the confines of Switzerland, and subject to the house of Austria. Their names are *Rhinefeld, Seckingen, Lausenbourg, and Waldshut*.

FORE-STAFF, an instrument used at sea for taking the altitudes of heavenly bodies. The fore-staff, called also *cross-staff*, takes its denomination hence, that the observer, in using it, turns his face towards the object; in contradistinction to the back-staff, where he turns his back to the object.

The fore or cross staff, represented in Plate CXCIV. consists of a straight square staff, A B, graduated like a line of tangents and four crosses or vanes, F F, E E, D D, C C, which slide thereon. The first and shortest of these vanes, F F, is called the *ten cross*, or *vane*, and belongs to that side of the instrument whereon the divisions begin at three degrees and end at ten. The next longer vane, E E, is called the *thirty cross*, belonging to that side of the staff wherein the divisions begin at ten degrees and end at thirty, called the *thirty scale*. The next vane, D D, is called the *sixty cross*, and belongs to the side where the divisions begin at twenty degrees and end at sixty. The last and longest, C C, called the *ninety cross*, belongs to the side whereon the divisions begin at thirty degrees and end at ninety.

Fore staff
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Forester.

The great use of this instrument is to take the height of the sun and stars, or the distance of two stars: and the ten, thirty, sixty, or ninety crosses, are to be used according as the altitude is greater or less; that is, if the altitude be less than ten degrees, the ten cross is to be used; if above ten, but less than thirty, the thirty cross is to be used, &c. *Note*, For altitudes greater than thirty degrees, this instrument is not so convenient as a quadrant or semicircle.

To observe an altitude by this instrument.—Apply the flat end of the staff to your eye, and look at the upper end of the cross for the centre of the sun or star, and at the lower end for the horizon. If you see the sky instead of the horizon, slide the cross a little nearer the eye; and if you see the sea instead of the horizon, slide the cross farther from the eye: and thus continue moving till you see exactly the sun or star's centre by the top of the cross, and the horizon by the bottom thereof. Then the degrees and minutes, cut by the inner edge of the cross upon the side of the staff peculiar to the cross you use, give the altitude of the sun or star.

If it be the meridian altitude you want, continue your observation as long as you find the altitude increase, still moving the cross nearer to the eye. By subtracting the meridian altitude thus found from 90 degrees, you will have the zenith distance. To work accurately, an allowance must be made for the height of the eye above the surface of the sea, viz. for one English foot, 1 minute; for 5 feet, $2\frac{1}{2}$; for 10 feet, $3\frac{1}{2}$; for 20 feet, 5; for 40 feet, 7, &c. These minutes subtracted from the altitude observed, and added to the zenith distance observed, give the true altitude and zenith distance.

To observe the distance of two stars, or the moon's distance from a star, by the fore-staff.—Apply the instrument to the eye, and looking to both ends of the cross, move it nearer or farther from the eye till you see the two stars, the one on the one end and the other on the other end of the cross; then the degrees and minutes cut by the cross on the side proper to the vane in use give the stars distance.

FORESTALLER, a person who is guilty of forestalling. See the next article.

FORESTALLING, in law, buying or bargaining for any corn, cattle, victuals, or merchandise, in the way as they come to fairs or markets to be sold, before they get thither, with an intent to sell the same again at a higher price.

The punishment for this offence, upon conviction at the quarter-sessions by two or more witnesses, is, for the first time, two months imprisonment and the loss of the goods, or the value; for the second offence, the offender shall be imprisoned six months, and lose double the value of the goods; for the third offence, he shall suffer imprisonment during the king's pleasure, forfeit all his goods and chattels, and stand on the pillory: but the statute does not extend to maltsters buying barley, or to badgers licensed.

FORESTER, a sworn officer of the forest, appointed by the king's letters-patent, to walk the forest at all hours, and watch over the vert and venison; also to make attachments and true presentments of all trespasses committed within the forest.

If a man comes into a forest in the night, a forester cannot lawfully beat him before he makes some resist-

ance; but in case such a person resists the forester, he may justify a battery. And a forester shall not be questioned for killing a trespasser that, after the peace cried to him, will not surrender himself, if it be not done on any former malice; though, where trespassers in a forest, &c. do kill a person that opposes them, it is murder in all, because they were engaged in an unlawful act, and therefore malice is implied to the person killed.

FORETHOUGHT-FELONY, in Scots law, signifies premeditated murder. See MURDER.

FORFAR, a parliament-town of Scotland, and capital of the county of that name, situated in N. Lat. 56. 25. W. Long. 2. 32. This town, with Dundee, Cupar, Perth, and St Andrew's, jointly send one member to the British parliament. It stands in the great valley of Strathmore that runs from Perth north-east to the sea, almost in a straight line, about 50 miles long and betwixt four and five miles broad, bordered on either side by hills, rising gently on the south side, and on the north by the famous Grampians, a little more elevated.

Though history is silent as to the etymology of the name *Forfar*, yet we are sure it is of very ancient date, and that in the days of old it was the residence of royal majesty. Here Malcom Canmore, a wife and magnanimous prince, held his first parliament in 1057. The ruins of his palace are still to be seen on the top of an artificial mount of a circular form, resting upon a base of about three acres of ground, and rising 50 feet high above the level of the circumambient plain. A wall of stone of a great thickness, so strongly cemented with run-lime that it is scarce possible to break the cement with the stroke of a hammer, environed the place; and a moat of at least 20 feet broad, and in some parts a great deal more, and 12 feet deep, encompassed the whole. Adjoining to this is a field of about six acres of ground called the *Queen's Manor*, surrounded in those days with a large sheet of water, and accessible only by boats. In clearing away some of the rubbish of the palace a few years ago, a tea-kettle of a conical figure, and a bunch of barbed arrows, were found in the ruins. A pit of about 18 feet deep, very prettily built of hewn stone, with a human body in a state of extreme putrefaction, was also discovered. The lake of Forfar, stretching two miles in length from east to west, and half a mile in breadth, and covering the palace on the north, afforded not only a plentiful supply of water for every purpose, but also added to the strength of the place. This lake abounds with trout, pike, perch, and eel. Of late years it has been greatly reduced by draining; to which the immense quantity of fine marble at the bottom was the principal inducement. This excellent marble is found here in large strata from two to six and eight feet deep, and generally below moss ten feet deep.

This lake has proved fatal to many of the human race; but particularly and deservedly so to the murderers of Malcom II. who having fled after perpetrating the bloody deed at the castle of Glamis, about five miles distant, in the year 1036, missed their way, owing to a deep fall of snow, and wandered in the fields for some time, till at last they came upon the ice on the lake, which not being firm, suddenly gave way under them, and they all perished. When the thaw

Fore-
thought,
Forfar.

Forfar.

came, their bodies were found; and being discovered to be the murderers of the king, they were all hung on gibbets on the sides of the highways.

Within this lake were formerly two islands raised by art, with buildings on each; to which Margaret, Malcom Canmore's queen, retired after the decease of her husband. Part of the ruins of these edifices are still to be seen. To this queen, tradition says, we owe the custom of the grace-drink; she having established it as a rule at her table, that whoever staid till grace was said was rewarded with a bumper.

From this time we have little or no accounts of Forfar till the middle of the 17th century, except an act passed in the 13th parliament of James VI. 21st July 1593, in the following words: "Our soveraine Lorde, understanding that be acte and ordinance maid anent observation of the Sabbath-daie within this realme, the mercatte-daie of the burgh of Forfare, being the head burgh of the schire, quhilk was Sundaie, is taken from them; and his hienesse not willing that they in onie waies suld be prejudged hereby, therefore his hienesse, with advise of the estaites of this present parliament, alteris and changis their said mercatte-daie from Sundaie to Fridaie, and willis the samen Fridaie oukly to be their mercatte daie to them in all times hereafter; and the samin to stonde with the like privileges and freedoms as the Sundaie did of before." Whether this change took place, or how long it continued, is uncertain; but the market-day is presently held on Saturday, and has been so past memory of man.

During the usurpation of Oliver Cromwell, a detachment of his forces, after sacking Dundee, came to Forfar and burnt all the public records of the place; and the only charter the town now has is one granted by Charles II. after his restoration, confirming all its ancient rights and privileges.

As an evidence of the ignorance and barbarity of the times, it appears from the records of the trials kept in the charter-chest of Forfar, that nine persons were condemned and burnt here for witchcraft betwixt the years 1650 and 1662. These innocent people were all tried by a special commission from the lords of the privy-council at Edinburgh; and although the commission expressly discharged torturing them on purpose to extort a confession of their guilt, yet, as it was then thought meritorious to obtain confession of guilt by whatever means, many inhuman cruelties were exercised upon the unfortunate objects; particularly, an iron boot was drawn upon one of their legs, and a wedge driven with great force between it and the leg. Another instrument, still carefully preserved here, was likewise used, and is called the *witch-bridle*. It is made of iron, in the shape of a dog's collar, with two pikes on the inside, about four inches distant and two and a half long. These pikes were put into the mouth, and the collar afterwards buckled strait on the back of the head, to which was affixed an iron chain, whereby the condemned persons were led to the place of execution called the *Play-field*, about a quarter of a mile to the northward of the town.

The inhabitants of Forfar are a hospitable, free, and generous set of people: they are at least doubled in number within these 30 years, being now about 3300: the houses have also increased more in proportion, besides being vastly improved. The church here has just

been rebuilt on an elegant and extensive plan calculated to contain 2000 hearers.

FORFAR Shire, a county of Scotland, of which Forfar is the capital. Including Angus, Glenila, Glenesk, and Glenprasslin, it extends 29 miles from east to west, and 16 where broadest, though in some places the breadth does not exceed five miles. On the north it is divided from the Brae of Mar by a ridge of the Binchinin mountains; it is bounded on the south by the Frith of Tay and the British ocean, on the east by Means, and on the west by Perthshire. Part of the Grampian mountains runs through this county, which is agreeably diversified with hill and dale. It produces lead and iron in abundance, together with quarries of freestone and slate, with which the inhabitants drive a considerable traffic. The county is well watered with lakes, rivers, rivulets, and fountains, shaded with large forests, roughened with brown mountains, and waved with green hills interspersed with fields and meadows, and adorned with fine seats and plantations. Their heaths and woods abound with hart, hind, roebuck, and moor-game; their streams are stocked with trout and salmon. Their hills are covered with flocks of sheep, and their fields afford plentiful harvests of wheat and all sorts of grain. The mountains to the west and north are inhabited by Highlanders: but the Lowlanders possess the towns and champaign country, and are remarkable for their politeness and hospitality.

FORFEITURE, originally signifies a transgression, or offence against some penal law. The word is formed of the base Latin *forisfactura*: whence *forfaitura* and *forfaitura*, and the French *forfait*. *Forisfactura* comes of *forisfacere*; which, according to Isidore, signifies to "hurt or offend," *facere contra rationem*; and which is not improbably derived of *foris* "out," and *facere*, "to do," q. d. an action out of rule, or contrary to the rules. Borel will have *forfait* derived from the using of force or violence: Lobineau in his glossary will have *forisfacta* properly to signify a mulct or amend, not a *forfeit*; which latter he derives from the base British *forfed*, "a penalty."

But, with us, it is now more frequently used for the effect of such transgression; or the losing some right, privilege, estate, honour, office, or effects, in consequence thereof; than for the transgression itself.

Forfeiture differs from *confiscation*, in that the former is more general; while confiscation is particularly applied to such things as become forfeited to the king's exchequer; and goods confiscated are said to be such as nobody claims.

Forfeitures may be either in *civil* or *criminal* cases.

I. With respect to the first, a man that hath an estate for life or years, may forfeit it many ways, as well as by treason or felony; such as alienation, claiming a greater estate than he hath, or affirming the reversion to be in a stranger, &c. When a tenant in tail makes leases not warranted by the statute; a copyholder commits waste, refuses to pay his rent, or do suit of court; and where an estate is granted upon condition, on non-performance thereof, &c. they will make a forfeiture.

Entry for a forfeiture ought to be by him who is next in reversion, or remainder, after the estate forfeited. As if tenant for life or years commits a forfeiture, he who has the immediate reversion or remainder ought

Forfar,
Forfeiture.

Forfeiture. ought to enter; though he has the fee, or only an estate-tail.

II. Forfeiture in criminal cases is twofold; of real, and personal estates.

I. As to real estates, by **ATTAINDER** in high-treason, a man forfeits to the king all his lands and tenements of inheritance, whether fee-simple or fee-tail; and all his rights of entry on lands and tenements, which he had at the time of the offence committed, or at any time afterwards, to be for ever vested in the crown; and also the profits of all lands and tenements, which he had in his own right for life or years, so long as such interest shall subsist. This forfeiture relates backwards to the time of the treason committed; so as to avoid all intermediate sales and incumbrances, but not those before the fact: and therefore a wife's jointure is not forfeitable for the treason of her husband; because settled upon her previous to the treason committed. But her dower is forfeited, by the express provision of statute 5 and 6 Edw. VI. c. 11. And yet the husband shall be tenant by the curtesy of the wife's lands, if the wife be attainted of treason: for that is not prohibited by the statute. But, though after attainder the forfeiture relates back to the time of the treason committed, yet it does not take effect unless an attainder be had, of which it is one of the fruits; and therefore, if a traitor dies before judgment pronounced, or is killed in open rebellion, or is hanged by martial law, it works no forfeiture of his lands: for he never was attainted of treason. But if the chief justice of the king's bench (the supreme coroner of all England) in person, upon the view of the body of him killed in open rebellion, records it and returns the record into his own court, both lands and goods shall be forfeited.

The natural justice of forfeiture or confiscation of property, for treason, is founded on this consideration: That he who hath thus violated the fundamental principles of government, and broken his part of the original contract between king and people, hath abandoned his connections with society, and hath no longer any right to those advantages which before belonged to him purely as a member of the community; among which *social* advantages, the right of transferring or transmitting property to others is one of the chief. Such forfeitures, moreover, whereby his posterity must suffer as well as himself, will help to restrain a man, not only by the sense of his duty, and dread of personal punishment, but also by his passions and natural affections; and will interest every dependent and relation he has to keep him from offending: according to that beautiful sentiment of Cicero, "*nec vero me fugit quam sit acerbum, parentum scelera filiorum penis lui: sed hoc præclare legibus comparatum est, ut caritas liberorum amiciores parentes reipublicæ redderet.*" And therefore Aulus Cascellius, a Roman lawyer in the time of the triumvirate, used to boast that he had two reasons for despising the power of the tyrants; his old age and his want of children: for children are pledges to the prince of the father's obedience. Yet many nations have thought, that this posthumous punishment favours of hardship to the innocent; especially for crimes that do not strike at the very root and foundation of society, as treason against the government expressly does. And therefore, although confiscations were very frequent in the times of the earlier emperors, yet Arca-

dius and Honorius, in every other instance but that of treason, thought it more just, *ibi esse penam, ubi et noxa est*; and ordered, that "*peccata suos teneant auctores, nec ulterius progrediatur metus, quam reperitur delictum.*" and Justinian also made a law to restrain the punishment of relations; which directs the forfeiture to go, except in the case of *crimen majestatis*, to the next of kin to the delinquent. On the other hand, the Macedonian laws extended even the capital punishment of treason, not only to the children, but to all the relations of the delinquent: and of course their estates must be also forfeited, as no man was left to inherit them. And in Germany, by the famous golden bull (copied almost *verbatim* from Justinian's code), the lives of the sons of such as conspire to kill an elector are spared, as it is expressed, by the emperor's *particular bounty*. But they are deprived of all their effects and rights of succession, and are rendered incapable of any honour ecclesiastical and civil: to the end that, being always poor and necessitous, they may for ever be accompanied by the infamy of their father; may languish in continual indigence; and may find (says this merciless edict) their punishment in living, and their relief in dying."

In England, forfeiture of lands and tenements to the crown for treason is by no means derived from the feudal policy, but was antecedent to the establishment of that system in this island; being transmitted from our Saxon ancestors; and forming a part of the ancient Scandinavian constitution. But in certain treasons relating to the coin (which seem rather a species of the *crimen falsi* than the *crimen læsæ majestatis*), it is provided by some of the modern statutes which constitute the offence, that it shall work no forfeiture of lands, save only for the life of the offenders; and by all, that it shall not deprive the wife of her dower. And, in order to abolish such hereditary punishment entirely, it was enacted by statute 7 Ann. c. 21. that, after the decease of the late pretender, no attainder for treason should extend to the disinheriting of any heir, nor to the prejudice of any person, other than the traitor himself. By which the law of forfeitures for high treason would by this time have been at an end, had not a subsequent statute intervened to give them a longer duration. The history of this matter is somewhat singular, and worthy observation. At the time of the union, the crime of treason in Scotland was, by the Scots law, in many respects different from that of treason in England; and particularly in its consequence of forfeitures of entailed estates, which was more peculiarly English: yet it seemed necessary, that a crime so nearly affecting government should, both in its essence and consequences, be put upon the same footing in both parts of the united kingdoms. In new-modelling these laws, the Scots nation and the English house of commons struggled hard, partly to maintain, and partly to acquire, a total immunity from forfeiture and corruption of blood: which the house of lords as firmly resisted. At length a compromise was agreed to, which is established by this statute, *viz.* that the same crimes, and no other, should be treason in Scotland that are so in England; and that the English forfeitures and corruption of blood should take place in Scotland till the death of the then pretender, and then cease throughout the whole of Great Britain: the lords artfully proposing this temporary clause, in hopes (it

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Forfeiture is said) that the prudence of succeeding parliaments would make it perpetual. This has partly been done by the statute 17 Geo. II. c. 39. (made in the year preceding the late rebellion); the operation of these indemnifying clauses being thereby still farther suspended till the death of the sons of the pretender.

In petit treason and felony, the offender also forfeits all his chattel interests absolutely, and the profits of all freehold estates during life; and after his death all his lands and tenements in fee simple (but not those in tail) to the crown, for a very short period of time: for the king shall have them for a year and a day, and may commit therein what waste he pleases; which is called the king's year, day, and waste. Formerly the king had only a liberty of committing waste on the lands of felons, by pulling down their houses, extirpating their gardens, ploughing their meadows, and cutting down their woods. And a punishment of a similar spirit appears to have obtained in the oriental countries, from the decrees of Nebuchadnezzar and Cyrus in the books of Daniel and Ezra; which, besides the pain of death inflicted on the delinquents there specified, ordain, "that their houses shall be made a dunghill." But this tending greatly to the prejudice of the public, it was agreed in the reign of Henry I. in England, that the king should have the profits of the land for one year and a day in lieu of the destruction he was otherwise at liberty to commit: and therefore *magna charta* provides, that the king shall only hold such lands for a year and a day, and then restore them to the lord of the fee, without any mention made of waste. But the statute 17 Edw. II. *de prerogativa regis*, seems to suppose, that the king shall have his year, day, and waste; and not the year and day instead of waste: which Sir Edward Coke (and the author of the *Mirror* before him) very justly look upon as an encroachment, though a very ancient one, of the royal prerogative. This year, day, and waste, are now usually compounded for; but otherwise they regularly belong to the crown; and after their expiration the land would naturally have descended to the heir (as in gavelkind tenure it still does), did not its feudal quality intercept such descent, and give it by way of escheat to the lord. These forfeitures for felony do also arise only upon attainder; and therefore a *felo de se* forfeits no lands of inheritance or freehold, for he never is attainted as a felon. They likewise relate back to the time the offence was committed as well as forfeitures for treason, so as to avoid all intermediate charges and conveyances. This may be hard upon such as have unwarily engaged with the offender: but the cruelty and reproach must lie on the part, not of the law, but of the criminal; who has thus knowingly and dishonestly involved others in his own calamities.

2. The forfeiture of goods and chattels accrues in every one of the high kinds of offence; in high treason, or misprison thereof, petit treason, felonies of all sorts whether clergyable or not, self-murder or felony *de se*, petty larceny, standing mute, &c. For flight also, on an accusation of treason, felony, or even petit larceny, whether the party be found guilty or acquitted, if the jury find the flight, the party shall forfeit his goods and chattels: for the very flight is an offence, carrying with it a strong presumption of guilt, and is at least an endeavour to elude and stifle the

course of justice prescribed by the law. But the jury very seldom find the flight; forfeiture being looked upon, since the vast increase of personal property of late years, as too large a penalty for an offence to which a man is prompted by the natural love of liberty.

There is a remarkable difference or two between the forfeiture of lands and of goods and chattels. (1.) Lands are forfeited upon *attainder*, and not before: goods and chattels are forfeited by *conviction*. Because in many of the cases where goods are forfeited, there never is any attainder; which happens only where judgment of death or outlawry is given: therefore, in those cases, the forfeiture must be upon conviction, or not at all; and, being necessarily upon conviction in those, it is so ordered in all other cases, for the law loves uniformity. (2.) The forfeiture of lands has relation to the time the fact was committed, so as to avoid all subsequent sales and incumbrances: but the forfeiture of goods and chattels has no relation backwards; so that those only which a man has at the time of conviction shall be forfeited. Therefore a traitor or felon may *bona fide* sell any of his chattels, real or personal, for the sustenance of himself and family between the fact and conviction: for personal property is of so fluctuating a nature, that it passes through many hands in a short time; and no buyer could be safe, if he were liable to return the goods which he had fairly bought, provided any of the prior vendors had committed a treason or felony. Yet if they be collusively and not *bona fide* parted with, merely to defraud the crown, the law (and particularly the statute 13 Eliz. c. 5.) will reach them; for they are all the while truly and substantially the goods of the offender: and as he, if acquitted, might recover them himself, as not parted with for a good consideration; so, in case he happens to be convicted, the law will recover them for the king.

FORFEX, in Roman antiquity, was a way of drawing up an army in the form of a pair of sheers. It was intended to receive the *cuneus* or wedge, if the enemy should make use of that figure. For when the forfex opened to admit the wedge, they had an opportunity of defeating their design, and cutting them in pieces.

FORFICULA, the EAR-WIG, in zoology, a genus of insects belonging to the order of coleoptera. The antennæ are bristly; the elytra are dimidiated; the wings are covered; and the tail is forked. There are two species, *viz.* the auricularia, or common earwig, with the tops of the elytra white; and the minor, with testaceous and unspotted elytra.—This genus of insects is one of the best known, the forceps at the extremity of their abdomen forming a very distinctive character. It is this seeming weapon that has occasioned those insects to be called *forficula* in Latin; and the formidable name of *ear-wigs* has been given them in English, from a notion that the insect frequently introduces itself into the ears, causing great pain, and even death. Mr Barbut, however, assures us, that the forceps which the ear-wig carries at his tail, and with which he seems provided for his defence, is not so formidable as it at first appears, being destitute of strength sufficient to produce the least sensible impression. The larva of the ear-wig differs very little from the perfect insect.

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Ear-wigs are very mischievous vermin in gardens, especially where carnations are preserved; for they are so fond of these flowers, that if care is not taken to prevent them, they will entirely destroy them, by eating off the sweet part at the bottom of the petals or leaves. To prevent which, most people have stands erected, which have a basin of earth or lead round each supporter, which is constantly kept filled with water. Others hang the hollow claws of crabs and lobsters upon sticks in divers parts of the garden into which those vermin get; and by often searching them, you will destroy them without much trouble, which will be of great service to your wall-fruit, for these are great destroyers also of all soft fruits.

FORGE, properly signifies a little furnace, wherein smiths and other artificers of iron or steel, &c. heat their metals red-hot; in order to soften them and render them more malleable and manageable on the anvil.

An ordinary forge is nothing but a pair of bellows, the nozzle of which is directed upon a smooth area, on which coals are placed. The nozzle of a pair of bellows may be also directed to the bottom of any furnace, to excite the combustion of the coals placed there, by which a kind of forge is formed. In laboratories, there is generally a small furnace consisting of one cylindrical piece, open at top, which has at its lower side a hole for receiving the nozzle of a double bellows. This kind of forge-furnace is very convenient for fusions, as the operation is quickly performed, and with few coals. In its lower part, two inches above the hole for receiving the nozzle of the bellows, may be placed an iron-plate of the same diameter, supported upon two horizontal bars, and pierced near its circumference with four holes diametrically opposite to each other. By this disposition, the wind of the bellows, pushed forcibly under this plate, enters at these four holes; and thus the heat of the fire is equally distributed, and the crucible in the furnace is equally surrounded by it. This contrivance is used in the forge-furnaces for melting copper, with this difference only, that these furnaces are square, which is a matter of no consequence.

As the wind of bellows strongly and rapidly excites the action of the fire, a forge is very convenient when a great heat is to be applied quickly: but it is not suitable when the heat is to be gradually increased.

The forge, or blast of bellows, is used in several operations in small; as to fuse salts, metals, ores, &c. It is also much used in works in the great, which require strong heat, without much management; and chiefly in the smelting of ores, and fusion of metallic matters.

FORGE is also used for a large furnace, wherein iron-ore, taken out of the mine, is melted down: or it is more properly applied to another kind of furnace, wherein the iron-ore, melted down and separated in a former furnace, and then cast into sows and pigs, is heated and fused over again, and beaten afterwards with large hammers, and thus rendered more soft, pure, ductile, and fit for use.

FORGE, in the train of artillery, is generally called a *travelling forge*, and may not be improperly called a portable smith's shop: at this forge all manner of smith's work is made, and it can be used upon a march as well as in camp. Formerly they were very ill contrived, with 2 wheels only, and wooden supporters to

prop the forge for working when in the park. Of late years they are made with 4 wheels, which answers their purpose much better.

FORGE for red-hot Balls, is a place where the balls are made red-hot before they are fired off: it is built about five or six feet below the surface of the ground, of strong brick-work, and an iron grate, upon which the balls are laid, with a very large fire under them.

FORGER, in law, one guilty of FORGERY.

FORGERY (from the French *forger*, i. e. *accudare, fabricare*, "to beat on an anvil, forge, or form,") may be defined at common law, to be "the fraudulent making or alteration of a writing to the prejudice of another man's right:" for which the offender may suffer fine, imprisonment, and pillory. And also, by a variety of statutes, a more severe punishment is inflicted on the offender in many particular cases, which are so multiplied of late as almost to become general. We shall mention the principal instances.

By statute 5 Eliz. c. 14. to forge or make, or knowingly to publish or give in evidence, any forged deed, court-roll, or will, with intent to affect the right of real property, either freehold or copyhold, is punished by a forfeiture to the party grieved of double costs and damages; by standing in the pillory, and having both his ears cut off, and his nostrils slit, and seared; by forfeiture to the crown of the profits of his lands, and by perpetual imprisonment. For any forgery relating to a term of years or annuity, bond, obligation, acquittance, release, or discharge of any debt or demand of any personal chattels, the same forfeiture is given to the party grieved; and on the offender is inflicted the pillory, loss of one of his ears, and half a year's imprisonment: the second offence, in both cases, being felony without benefit of clergy.

Besides this general act, a multitude of others, since the revolution (when paper-credit was first established), have inflicted capital punishment on the forging, altering, or uttering as true when forged, of any bank bills or notes, or other securities; of bills of credit issued from the exchequer; of south-sea bonds, &c.; of lottery tickets or orders; of army or navy debentures; of East India bonds; of writings under seal of the London or royal-exchange assurance; of the hand of the receiver of the pre-fines, or of the accountant-general and certain other officers of the court of chancery; of a letter of attorney or other power to receive or transfer stock or annuities; and on the personating a proprietor thereof, to receive or transfer such annuities, stock, or dividends: also on the personating, or procuring to be personated, any seaman or other person, intitled to wages or other naval emoluments, or any of his personal representatives; and the taking, or procuring to be taken, any false oath in order to obtain a probate or letters of administration, in order to receive such payments; and the forging, or procuring to be forged, and likewise the uttering or publishing, as true, of any counterfeited seaman's will or power: to which may be added, though not strictly reducible to this head, the counterfeiting of Mediterranean passes, under the hands of the lords of the admiralty, to protect one from the piratical states of Barbary; the forging or imitating of any stamps to defraud the public revenue: and the forging of any marriage register or licence: all which are, by distinct acts of parliament,

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Forging liament, made felonies without benefit of clergy. By statutes 13 Geo. III. c. 52. & 59. forging or counterfeiting any stamp or mark to denote the standard of gold and silver plate, and certain other offences of the like tendency, are punished with transportation for 14 years. By statute 12 Geo. III. c. 48. certain frauds on the stamp-duties, therein described, principally by using the same stamps more than once, are made single felony, and liable to transportation for seven years. And the same punishment is inflicted by statute 13 Geo. III. c. 38. on such as counterfeit the common seal of the corporation for manufacturing plate-glass (thereby erected), or knowingly demand money of the company by virtue of any writing under such counterfeit seal.

There are also two other general laws, with regard to forgery; the one 2 Geo. II. c. 25. whereby the first offence in forging or procuring to be forged, acting or assisting therein, or uttering or publishing as true, any forged deed, will, bond, writing obligatory, bill of exchange, promissory note, indorsement or assignment thereof, or any acquittance or receipt for money or goods, with intention to defraud any person (or corporation), is made felony without benefit of clergy. And by statute 7 Geo. II. c. 22. it is equally penal to forge, or cause to be forged, or utter as true, a counterfeit acceptance of a bill of exchange, or the number of any accountable receipt for any note, bill, or any other security for money, or any warrant or order for the payment of money, or delivery of goods. So that, through the number of these general and special provisions, there is now hardly a case possible to be conceived, wherein forgery, that tends to defraud, whether in the name of a real or fictitious person, is not made a capital crime.

FORGING, in law, the act of **FORGERY**:

FORGING, in smithery, the beating or hammering iron on the anvil, after having first made it red-hot in the forge, in order to extend it into various forms, and fashion it into works. See **FORGE**.

There are two ways of forging and hammering iron. One is by the force of the hand, in which there are usually several persons employed, one of them turning the iron and hammering likewise, and the rest only hammering. The other way is by the force of a water-mill, which raises and works several huge hammers beyond the force of man; under the strokes whereof the workmen present large lumps or pieces of iron, which are sustained at one end by the anvils, and at the other by iron-chains fastened to the ceiling of the forge. See **MILL**.

This last way of forging is only used in the largest works, as anchors for ships, &c. which usually weigh several thousand pounds. For the lighter works, a single man serves to hold, heat, and turn with one hand, while he hammers with the other.

Each purpose the work is designed for requires its proper heat; for if it be too cold, it will not feel the weight of the hammer, as the smiths call it when it will not batter under the hammer; and if it be too hot, it will read-fear, that is, break or crack under the hammer.

The several degrees of heat the smiths give their irons, are, first, a blood-red heat; secondly, a white-flame-heat; and, thirdly, a sparkling or welding heat.

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FORISFAMILIATION, in law. When a child, upon receiving a portion from his father, or otherwise, renounces his legal title to any further share of his father's succession, he is said to be *forisfamiliated*.

FORK, a well-known instrument, consisting of a handle and blade, divided at the end into two or more points or prongs.

The *pitch-fork* is a large utensil of this construction, employed in hay-making, &c.

The *table-fork*, an instrument now so indispensable, did not come into use in England till the reign of James I. as we learn from a remarkable passage in Coryat. The reader will probably smile at the solemn manner in which this important discovery or innovation is related: "Here I will mention a thing that might have been spoken of before in discourse of the first Italian towns. I observed a custom in all those Italian cities and townes through the which I passed, that is not used in any other country that I saw in my travels, neither do I think that any other nation of Christendome doth use it, but only Italy. The Italian and also most strangers that are commonant in Italy, doe always at their meals use a little forke when they eat their meate; for while with their knife which they hold in one hand they cut the meate out of the dish, they fasten the fork which they hold in the other hand upon the same dish, so that whatsoever he be that sitting in the company of any others at meale should unadvisedly touch the dish of meat with his fingers from which all the table doe cut, he will give occasion of offence unto the company as having transgressed the lawes of good manners, in so much that for his error he shall be at least brow-beaten if not reprehended in wordes. This form of feeding I understand is generally used in all parts of Italy, their forkes for the most part being made of yronn, Steele, and some of silver, but those are used only by gentlemen. The reason of this their curiosity is, because the Italian cannot by any means indure to have his dish touched with fingers, seeing all mens fingers are not alike cleane. Hereupon I myself thought good to imitate the Italian fashion by this forked cutting of meate, not only while I was in Italy, but also in Germany, and often times in England since I came home: being once quipped for that frequently using my forke, by a certain learned gentleman a familiar friend of mine, Mr Lawrence Whitaker; who in his merry humour doubted not to call me a table *Furcifer*, only for using a forke at feeding, but for no other cause."

FORLI, an ancient and considerable town of Italy, and capital of a territory of the same name, in Romagna, with a bishop's see. The public structures are very handsome; and it is seated in a fertile, healthy, and pleasant country, 10 miles south-east of Faenza, and 45 north-east of Florence. E. Long. 12. 1. N. Lat. 44. 28.

FORLORN-HORN, in the military art, signifies men detached from several regiments, or otherwise appointed, to make the first attack in day of battle; or, at a siege, to storm the counterscarp, mount the breach, or the like. They are so called from the great danger they are unavoidably exposed to; but the word is old, and begins to be obsolete.

FORM, in physics, denotes the manner of being peculiar to each body; or that which constitutes it such

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a particular body, and distinguishes it from every other.

Mr Harris uses the term *form* likewise in another sense, as an efficient animating principle; to which he supposes Ovid to refer in the first lines of his *Metamorphosis*,

*In nova fert animus mutatas dicere formas
Corpora*

These animating forms are of themselves no objects either of the ear or of the eye; but their nature or character is understood in this, that were they never to exert their proper energies on their proper subjects, the marble on which the sculptor exercises his art would remain for ever shapeless, and the harp from which the harper calls forth sounds would remain for ever silent.

Thus, also, the animating form of a natural body is neither its organization nor its figure, nor any other of those inferior forms which make up the system of its visible qualities; but it is the power, which is yet able to produce, preserve, and employ these. It is the power, which first moves, and then conducts that latent process, by which the acorn becomes an oak, and the embryo becomes a man; by which digestion is performed in plants and animals, and, which departing, the body ceases to live, and its members putrefy; and by which every being produces another like itself, and every species is continued. In animals, it is that higher faculty, which, by employing the organs of sense, peculiar to them as animals, distinguishes them as sensitive beings from vegetables; and it is also that more noble faculty, which by its own divine vigour, unassisted perhaps with organs, makes and denominates him a being intellectual and rational. So that Mr Harris reckons two sorts of forms, those which are passive elements, and those which are efficient causes. And all of them agree in this, that they give to every being its peculiar and distinctive character: and on the whole he concludes, that form appears in part to be an element, and in part an efficient cause, *i. e.* a cause which associates the constituent elements of natural substance, and which employs them, when associated, according to their various and peculiar characters.

The philosophers generally allow two principles of bodies: *matter*, as the common basis or substratum of all; and *form*, as that which specifies and distinguishes each; and which, added to a quantity of common matter, determines or denominates it this or that; wood, or fire, or ashes, &c.

Substantial forms seem to have been first broached by the followers of Aristotle, who thought matter, under different modes or modifications, not sufficient to constitute different bodies; but that something substantial was necessary to set them at a greater distance: and thus introduced substantial forms, on the footing of souls, which specify and distinguish animals. What led to this erroneous notion was the circumstances of life and death: For observing, that, as soon as the soul was departed out of a man, all motion, respiration, nutrition, &c. immediately ceased, they concluded, that all these functions depended on the soul, and consequently that the soul was the form of the animal body, or that which constituted it such: that the soul was a substance, independent of matter, no body doubted; and hence the forms of other bodies

were concluded equally substantial. But to this it is answered, that though the soul be that by which a man is man, and consequently is the form of the human body, as human; yet it does not follow, that it is properly the form of this body of ours, as it is a body; nor of the several parts thereof, considered as distinct from each other: For those several parts have their proper forms so closely connected with their matter, that it remains inseparable therefrom long after the soul has quitted the body: thus, flesh has the form of flesh, bone of bone, &c. long after the soul is removed as well as before. The truth is, the body does not become incapable of performing its accustomed functions because the soul has deserted it; but the soul takes its leave, because the body is not in a condition to perform its functions.

The ancient and modern corpuseular philosophers, therefore, with the Cartesians, exclude the notion of substantial forms; and show, by many arguments, that the form is only the *modus* or manner of the body it is inherent in. And as there are only three primary modes of matter, *viz.* figure, rest, or motion, with two others arising therefrom, *viz.* magnitude and situation, the form of all bodies they hold to consist therein; and suppose the variations these modes are capable of, sufficient to present all the variety observable in bodies.

Forms are usually distinguished into *essential* and *accidental*.

Essential. Though the five modes above mentioned, generally taken, be adventitious; yet to this or that body, *e. gr.* to fire or water, they are essential: thus, it is *accidental* to iron, to have this or that magnitude, figure, or situation, since it might exist in different ones; yet to a knife or hammer, the figure, magnitude, and position of parts, which constitute it a hammer or knife, are essential; and they cannot exist or be conceived without them. Hence it is inferred, that though there be no substantial, there are essential, forms, whereby the several species of bodies become what they are, and are distinguished from all others.

Accidental forms, are those really inherent in bodies, but in such manner as that the body may exist in all its perfection without them. Such is whiteness in a wall, heat in water, a figure of a man in wax, &c.

FORM is also used, in a moral sense, for the manner of being or doing a thing according to rules: thus we say, a form of government, a form of argument, &c.

FORM, in law, the rules established and requisite to be observed in legal proceedings.—The formal part of the law, or method of proceeding, cannot be altered but by parliament; for if once these outworks were demolished, there would be an inlet to all manner of innovation in the body of the law itself.

FORM, in carpentry, is used to denote the long seats or benches in the choirs of churches or in schools, for the priests, prebends, religious, or scholars, to sit on. Du-Cange takes the name to be derived from hence, that the backs of the seats were anciently enriched with figures of painting and sculpture, called in Latin *formæ et typi*. In the life of St William of Roschild, we meet with *forma* as signifying a seat for an ecclesiastic, or religious, in a choir; and in that of St

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Lupicin, we have formula in the same sense. In the rule of the monastery of St Cæfare, the nun who presides over the choir is called *primiceria, vel formari*.

At schools, the word *form* is frequently applied to what is otherwise termed a *class*. See CLASS.

FORM also denotes the external appearance or surface of a body, or the disposition of its parts, as to the length, breadth, and thickness.

FORM is also used among mechanics, for a sort of mould whereon any thing is fashioned or wrought.

Printer's FORM, an assemblage of letters, words, and lines, ranged in order, and so disposed into pages by the compositor; from which, by means of ink and a press, the printed sheets are drawn.

Every form is inclosed in an iron-chase, wherein it is firmly locked by a number of pieces of wood; some long and narrow, and others of the form of wedges. There are two forms required for every sheet, one for each side; and each form consists of more or fewer pages according to the size of the book.

Hatter's FORM, is a large block or piece of wood, of a cylindrical figure; the top thereof rounded, and the bottom quite flat. Its use is, to mould or fashion the crown of the hat, after the matter thereof has been beaten and filled.

Paper-maker's FORM, is the frame or mould wherein the sheets are fashioned. See PAPER.

FORMA PAUPERIS, in law, is when a person has just cause of suit, but is so poor that he cannot defray the usual charges of suing at law or in equity; in which case, on making oath that he is not worth L.5 in the world, on all his debts being paid, and producing a certificate from some lawyer that he has good cause of suit, the judge will admit him to sue in *forma pauperis*; that is, without paying any fee to counsellors, attorneys, or clerk: the statute 11 Hen. VII. c. 12. having enacted, that counsel and attorneys, &c. shall be assigned to such poor persons *gratis*. Where it appears that any pauper has sold or contracted for the benefit of his suit whilst it is depending in court, such cause shall be thenceforth totally dismissed; and a person suing in *forma pauperis*, shall not have a new trial granted him, but is to acquiesce in the judgment of the court.

FORMAL, something belonging to or constituting the form of a thing. See FORM.

FORMALITY, the quality of a form, or formula; or that which constitutes and denominates them such.

FORMALITY, as defined in the schools, is any manner wherein a thing is conceived; or a manner in any object, importing a relation to the understanding, whereby it may be distinguished from another object. Thus, animality and rationality are formalities. The Scottists make great use of formalities, in opposition to the virtualities of the Thomists.

FORMALITIES, in matters of law, are frequently used for the formulas themselves, or the rules prescribed for judiciary proceedings. In contracts of strict law, all the formalities must be strictly observed: an omission of the least formality may ruin the whole convention.

The term is also used for a certain order, or decorum to be observed.

FORMAN (Andrew), archbishop of St Andrew's,

earl of Pittenweem, and of Cottingham in England, one of the lords of the regency appointed by the states during the minority of king James V. of Scotland, legate a-latere, primate of all the kingdom of Scotland, and archbishop of Bourges in France, was descended from the family of the Formans of Hutton in the shire of Berwick, and is considered to have been one of the best statesmen of the age in which he lived. He was employed in 1501, along with Robert Blackader archbishop of Glasgow and Patrick earl of Bothwell, to negotiate a match between Ja. IV. of Scotland and Margaret eldest daughter of Hen. VII. of England; which next year was ratified by the Scottish ambassadors. He was afterwards frequently employed as Scots ambassador to Rome, England, and France, upon the most important occasions. In 1514 he was translated from the see of Moray, to which he had been appointed in 1502, to that of St Andrew's. During the time of his possessing the former, he was employed as mediator betwixt Pope Julius II. and Louis XII. of France, who were at that time at variance; and he happily succeeded in conciliating the difference. Having taken leave of the Pope, he passed through France on his return home, where he was kindly received by the king and queen, who bestowed upon him the bishopric of Bourges in France, which annually brought him in 400 tons of wine, 10,000 franks of gold, and other smaller articles. Besides all this, he was most liberally rewarded by Pope Julius; who promoted him to the archbishopric of St Andrew's, as has been already mentioned; conferred on him the two rich abbeys of Dunfermline and Aberbrothick; and made him his legate a-latere. At that time, however, there were two other candidates for the archiepiscopal see. The learned Gavin Douglas bishop of Dunkeld having been nominated by the queen, had actually taken possession of it; but John Hepburn, a bold and factious man, having been preferred by the monks, drove out the officers of Gavin Douglas, and placed a strong garrison in the castle. So great was the power of this man, that when Forman was nominated by the Pope, no person could be found who durst proclaim the bulls for his election. At last lord Home, at that time the most powerful nobleman in Scotland, was induced, by large promises, besides some gifts of great consequence, among which was the donation of the abbacy of Coldingham to his youngest brother David, to undertake the task. It was executed at Edinburgh and St Andrew's; to which places lord Home's brother went with 10,000 men; though the doing of it, contrary to Forman's inclination, proved a source of much trouble to that nobleman afterwards. The quarrel betwixt Hepburn and Forman, however, was at last terminated by the latter surrendering the bishopric of Moray, as well as some years revenue of the archbishopric itself; paying Hepburn also 3000 French crowns annually out of his ecclesiastical revenues. On the appointment of the duke of Albany to the regency, Hepburn endeavoured to undermine the primate's credit with that nobleman, by representing him as one who had in a manner collected all the money in the country, and who consequently might endanger the tranquillity of the kingdom. These insinuations, however, were but little regarded by the regent; and Forman had the good fortune afterwards to make up a

Formation difference between him and the nobility, which was likely to be attended with much bloodshed. In 1517 the archbishop was appointed by the states one of the lords of the regency, on occasion of the duke of Albany's going to France. We have already mentioned his embassy to Pope Julius II. In McKenzie's lives we are informed that in the collection of the Letters of the Scottish Kings from the year 1505 till the year 1626, in the lawyers library, there is a letter from that pope to king James IV. wherein he not only highly commends Forman, but likewise promises that at the first creation of cardinals he should be made one. This letter is dated the 6th of May 1511: but the pope died before he had an opportunity of performing his promise. In the same collection there is a letter from the duke of Albany to Leo X. Julius's successor, wherein he presses the pope to advance him to the dignity of a cardinal promised him by his predecessor, and to continue him his legate a latere. Archbishop Forman died in 1521, and was buried at Dunfermline. Dempster says that he wrote a book against Luther, a book concerning the Stoic Philosophy, and a Collection out of the Decretals.

FORMATION, in philosophy, an act whereby something is formed or produced.—For the formation of the fœtus in the womb, see ANATOMY, n° 109, 110.

FORMATION of Stones. See STONE.

FORMATION of Metals and Minerals. See METAL and MINERAL.

FORMATION, in grammar, signifies the manner of forming one word from another: thus *accountantship* is formed from *accountant*, and this last from *account*.

FORMEDON, in law; (*breve de forma donationis*), a writ that lies for a person who has a right to lands or tenements, by virtue of any entail, arising from the statute of Westminster 2 Ch. II.

This writ is of three kinds, viz. a descender, remainder, and reverter. Formedon in *descender*, lies where a tenant in tail infeoffs a stranger, or is disseised and dies, and the heir may bring this writ to recover the lands. Formedon in *remainder*, lies where a man gives lands, &c. to a person in tail, and, for default of issue of his body, the remainder to another in tail: here if the tenant in tail die without issue, and a stranger abates and enters into the land, he in remainder shall have this writ. Formedon in *reverter*, lies where lands are entailed on certain persons and their issue, with remainder over for want of issue; and, on that remainder failing, then to revert to the donor and his heirs: in this case, if the tenant in tail dies without issue, and also he in remainder, the donor and his heirs, to whom the reversion returns, may have this writ for the recovery of the estate, though the same be alienated, &c.

FORMIÆ, or **FORMIA**, (anc. geog.), a maritime town of the Adjected or New Latium, to the south-east of Cajeta; built by the Lacedæmonians, (Strabo); called originally *Hormiæ*, on account of its commodious harbour. An ancient municipium, *Formiani*, the people; who were admitted to the liberty of the city the very year in which Alexandria was built; but not to the right of suffrage till a long time after the second Punic war, (Livy). *Formiæ* at this day lies in ruins, near a place now called *Mola*.

FORMICA, or the **ANT**, in zoology; a genus of **Formica** insects belonging to the order of hymenoptera, the characters of which are these: There is a small scale Plate betwixt the breast and belly; and the joint is so deep, CXCVI. that the animal appears as if it were almost cut thro' the body. The females, and the neuters or working ants which have no sexual characteristics, are furnished with a hidden sting; and both the males and females have wings, but the neuters have none. There are 18 species, most of them distinguished by their colours.

These insects keep together in companies like the bees, and maintain a sort of republic. Their nest is not exactly square, but longer one way than the other; and in it there are a sort of paths, which lead to different magazines. Some of the ants are employed in making the ground firm, by mixing it with a sort of glue, for fear it should crumble and fall down upon them. They may be sometimes seen to gather several twigs, which serve them for rafters, which they place over the paths, to support the covering; they lay others across them, and upon them rushes, weeds, and dried grass, which they heap up into a double declivity, which serves to turn off the water from their magazines. Some of these serve to lay up their provisions in, and in others they lay their eggs.

As for the provisions, they lay up every thing that is fit for them to eat; and you may often see one loaded with pippin or grain of fruit, another with a dead fly, and several together with the carcase of a may-bug or other insect. If they meet with any they cannot bring away, they eat it upon the spot, or at least so much of it as may reduce it to a bulk small enough for them to carry. They do not run about where they please, at all adventures: for some of them are sent abroad to make discoveries; and if they bring back news that they have met with a pear, or a sugar loaf, or a pot of sweetmeats, they will run from the bottom of the garden, as high as the third story of a house, to come at it. They all follow each other in the same path, without wandering to the right or the left; but in the fields they are more at their liberty, and are allowed to run about in search of game. There is a sort of green fly*, that does a great deal of mischief among the flowers, and ^{phis.} which curls up the leaves of peach and pear trees; and these are surrounded with a sort of glue, or honey, which the ants hunt after very greedily; for they touch neither the plant nor the flies themselves. Next to this, their greatest passion is to lay up hoards of wheat and other corn; and for fear the corn should sprout by the moisture of the subterraneous cells, they gnaw off the end which would produce the blade. The ants are often seen pushing along grains of wheat or barley much larger than themselves. It is remarkable, that if one ant meets another that is loaded, it always gives way to let it pass freely; or will help it if it be overburdened.

The ant lays eggs in the manner of the common flies; and from these eggs are hatched the larvæ, a sort of small maggots or worms without legs: these are sharp at one end and blunt at the other; and are white, but so transparent that the intestines are seen through the skin. These, after a short time, change into large white aureliæ or chrysalids, which are what are usually called *ants eggs*. That end which is to be the tail is the

Formica. the largest, and that which is the head is somewhat transparent. The ants move these about at pleasure with their forceps. It is well known, that when a nest of these creatures is disturbed, and the aureliæ scattered about, the ants are at infinite pains to get together all that are unhurt, and make a nest for them again: nay, any ants will do this, and those of one nest will often take care of the aureliæ of another.

The care these creatures take of their offspring is remarkable. Whenever a hill is disturbed, all the ants are found busied in consulting the safety, not of themselves, but of the eggs or those larger bodies inclosing the maggot or young ant; they carry these down any way so as to get them out of sight, and will do this over and over as often as they are disturbed. They carry away the eggs and vermicles together in their confusion; but, as soon as the danger is over, they carefully separate them, and place each sort in parcels by themselves under shelter of different kinds, and at various depths, according to the different degrees of warmth and coverture the different states require. In the warm season of the year, they every morning bring up the eggs, as they are usually called, to the surface, or nearly so; and from ten in the forenoon to five in the afternoon or thereabouts, all these will be found just under the surface: and if the hills be examined toward eight in the evening, they will be found to have carried them all down; and if rainy weather be coming on, it will be necessary to dig a foot deep or more, in order to find them. All human precautions have not hitherto been able to supply that degree of warmth and minute attention which the ants put in practice to forward the instant of their last metamorphosis. The insect, issuing forth to a new life, tears its white transparent veil; it is then a real ant, destitute of wings, if it has no sex; winged, if it be male or female, always to be known by a small erect scale placed on the thread which connects the body and thorax. Ants transact their amours in the air. The males, who are much smaller, seldom frequent the common habitation: but the females much larger, repair to it to deposit their eggs, which is all the labour they undergo; the winter's cold destroys them. As to the males, it is uncertain whether they fall victims to the severity of winter, or are made over to the rage of the labouring ants. These last pass the winter in a torpid state, as some other insects do, till spring restores them to their wonted activity: they have therefore no stores for winter, no consumption of provisions. What are commonly sold in markets for ant's eggs are grubs newly hatched, of which pheasants, nightingales, and partridges, are very fond. The chief enemies to ants are the *formicaleo*, magpies, and some other birds and beasts.

In the hotter countries, as Italy, Spain, and the West Indies, ants are the greatest pest of the fields. Trees, which they are said to injure greatly, may be preserved from them by encompassing the stem, for four fingers breadth, with a roll of wool, newly pulled from the sheep's belly; or by laying saw-dust all round the stump of it. Some anoint the tree with tar, which has the same effect. But whatever harm they may do in pasture-lands, by making up hills for their habitation and impairing or drying up the grass, their damaging fruit-trees appears to be an unjust reproach. On the contrary, in Switzerland they are made sub-

servient to the destruction of caterpillars. This is done by hanging a pouch filled with ants upon a tree; and they, making their escape through an aperture contrived on purpose, run over the tree without being able to reach down to the ground, because care has been previously taken to besmear the foot of the tree with wet clay or soft pitch; in consequence of which, compelled by hunger, they fall upon the caterpillars and devour them. People pretend to say, that ants, taken inwardly, give a spring to the urinary ducts and to the organs of generation. The red colour which they communicate to blue paper, when crushed upon it, proves that they contain an acid (see CHEMISTRY, n° 2d 907.)

The large, black, winged ants of America, to avoid the great rains which fall there at particular seasons, make to themselves large nests on trees, with a covered way for them to go up and down on the lee-side of the tree. These nests are roundish on the outside, made of light brown earth, plastered smooth. They are larger than a bushel; and in the inside are many sinuous caverns or lodgings communicating with one another. See Plate CXCVI. A, The ants nest; B, The tubular passage, made of the same materials.

As to those insects called *white ants*, which abound in Africa and the East Indies, they belong to a different genus; for which see the article TERMES.

Formica-Leo, the *Ant-lion*, in zoology, an insect so called from its devouring great numbers of ants. It is the caterpillar or worm of a fly much resembling the libellæ or dragon-flies; and feeds chiefly upon ants, from which property it derives its name.

It is somewhat of the nature of the spider in its way of taking its prey, its manner of spinning, and the figure and softness of its body. It has, in its general figure, somewhat of the appearance of the millepes or wood-louse, so that some have mistaken it at first sight for that animal. It is of a dirty greyish colour, marked with some black spots; and these are also composed of many points when viewed with a microscope, which make it resemble a hedge-hog or porcupine. Its body is composed of several rings, and has thence a wrinkled look. It has six legs, four are joined to the breast, and the other two to a longer part, which may be taken for its neck. Its head is small and flat, and it has two remarkable horns: these are about a sixth part of an inch long, and as thick as a hair: they are hard, hollow, and hooked at the end like the claws of a cat. At the origin of each of these horns, it has a clear and bright black eye, which sees very distinctly, and gives the creature notice to escape on sight of the smallest object.—This creature is not able to hunt after its prey, nor to destroy large insects; it can only draw into its snares such as come near its habitation, and of these very few are such as he can manage: all the winged kind are able to escape by flight; and the beetle kinds, and others that have hard shells upon their bodies, are of no use to him, as his horns cannot pierce them. The smallness of the ant, and the want of wings in the neuters, make them the destined prey of this devourer. The manner in which he catches his prey is as follows.

He usually encamps under an old wall, that he may be sheltered from the injuries of the weather; and he always chooses a place where the soil is composed of a fine dry sand. In this he makes a pit of the shape of

Formica. a funnel, or an inverted hollow cone. If he intends the pit to be but small, he thrusts down his hinder part into the sand, and by degrees plunges himself backward into it; and when he has got to a certain depth, he tosses out the loose sand which has run down with his head, artfully throwing it off beyond the edges of his pit. Thus he lies at the bottom of a small hollow, which is widest at the top, and comes sloping down to his body.

But if he is to make a larger pit, more pains are required to bring it to perfection. He first traces, in the surface of the sand, a large circle, which is the erected base or mouth of the pit he is to make in form of an inverted cone. He then buries himself in the sand near the edge of this circle, and carefully throws up the sand above him, with his head tossing it out beyond the circumference of the circle. Thus he continues his work, running down backwards in a spiral line all the way, and carefully throwing off the sand from above him, till he is come to the place of his rest, which is the point or reverted apex of the hollow cone he has formed by his passage. The length of his neck, and the flatness of his head, gives him a power of using the whole as a spade, and throwing off the sand with great ease; and his strength in this part is so great, that he is able to throw off a quantity of it to six inches distance. This is a power he exerts oftener, however, in throwing away the remains of the animals he has fed upon, that his den may not become frightful to others of the same species, by seeing their fellow carcases about it.

When he has finished his pit, he buries himself at the bottom of it among the sand, leaving no part above ground but the tips of his two horns, which he expands to the two sides of the pit. In this condition he lies and waits for his prey, and never comes up afterwards. When an ant, or any other such creature, chanced to walk over the edges of his pit, its steps throw down a little of the sand, which naturally running down to the bottom of the pit, gives the enemy notice of his prey; he then tosses up the sand which covers his head, to bury the ant, and bring him down with its returning force to the bottom; and as one such attempt cannot be sufficient to prevent the ant's escape, he throws more and more sand upon him, till he by degrees brings him down. All the endeavours of the ant to escape, when once it is within the verge of the pit, are in vain; for, as it attempts to climb, the sand runs away from under its feet, and it sinks the lower for every attempt. This motion of the sand also informs the enemy where it is, and directs him to throw up more sand in the right place; which it does, till the poor ant falls to the bottom between its horns. It then plunges the points deep into the ant's body; and having sucked all the juice out of the prey, it throws out the empty skin as far from the hole as it can. This done, it mounts up the edges of its pit, and if it has suffered any injury, repairs it with great care, and immediately buries itself again in the centre, to wait for another meal. The horns of this creature are its only organs for receiving nourishment; it never brings any animal which it has seized near to its head, but always holds it at the tip of the horns. They therefore plainly serve as syringes, to draw into its stomach the juices of the bodies of the insects it feeds upon: neither is there any

Formica. mouth or trunk, or any other organ to be discovered about its head, which could serve to the purpose of eating; the head seeming only intended for throwing away the sand in forming the pit. The horns of this animal being so necessary to its life, nature has provided for the restoring them in case of accidents; and, if cut off, they are found to grow again.

The food this creature procures by its pit can be but little; and as it has no power of catching its prey any other way, its motion being only backwards, and that slowly, and by small spaces at a time, some people have believed its catching now and then an ant by this means was rather for diversion than hunger. But tho' the *formica-leo* will live a long time without food, and even pass through all its changes when shut up in a box, yet it is always ready to eat when food is offered it; it always appears starved and small when kept thus; and if a fly is given it in this hungry state, it will so suck out all its juices, that the shell remaining may be rubbed to powder between the fingers, while the body of the creature that has sucked it appears remarkably swelled and distended; so that it is plain that the juices of the prey are conveyed into the body of the creature; though it is not easy to see by what means, the horns not appearing to have any perforation.

When the *formica-leo* has lived a proper time in this state, it leaves its pit, and is only seen drawing lines and traces on the surface of the sand. After this it buries itself under the surface; and there incloses itself in a fine web, in which it is to pass its transformation into the winged state. This case is made of a sort of silk which the creature spins in the manner of the spider, and of a quantity of the grains of sand cemented together by a glutinous humour which flows from its pores. This case, however, would be too harsh and coarse for the body of the creature, and therefore it serves only for the outer covering to defend it from injuries; the creature spinning one of pure and incomparably fine silk, of a beautiful pearl colour, within it, which covers its whole body.

When the creature has lain some time in this case, it throws off its outer skin, with the eyes, the horns, and every other part necessary to its life before, and becomes an oblong nymph, in which a careful eye may trace the form of the fly into which it is to be transformed. There may be seen, through its transparent covering, new eyes, new horns, wings, and all the other parts of the animal in its perfect state. This nymph makes its way about half out of the shell, and remains in this condition, but without farther life or motion, till the perfect fly makes its way out at a slit in the back. In this last state it much resembles the libellæ or dragon-flies common about our waters. The male couples with the female in this state only; and M. Poupert, to whom the world is obliged for this curious description, is of opinion that the females lay only one egg; but this is very different from the course of nature in the other animals of the same class.

When this insect forms its pit in a bed of pure sand, it is made and repaired with great ease; but where it meets with other substances among the sand, the labour becomes greatly the more embarrassing. If, for instance, when the creature has half formed its pit, and then comes to a stone of some moderate size, it does not desert the work for this, but goes on, intending to remove

Forming,
Formosa.

remove that impediment at last. When the pit is finished, the creature crawls backward up the side of the place where the stone is, and getting its backside under it, takes great pains and time to get it on a true poise, and then begins to crawl backward with it up the edge to the top of the pit, to get it out of the way. It is a very common thing to see a formica-leo in this manner labouring at a stone four times as big as its own body; and as it can only move backward, and the poise is hard to keep, especially up a slope of such crumbly matter as sand, which moulders away from under its feet, and necessarily alters the position of its body, the stone very frequently falls down when near the verge, and then it is sure to roll to the bottom. In this case the animal attacks it again in the same way, and often is not discouraged by five or six miscarriages of this kind; but, after all, attempts again, and at length gets it over the verge of the place. When it has done this, it does not leave it there, lest it should roll in again; but is always at the pains of pushing it farther on, till it has removed it to a necessary distance from the edge of the pit.

The common formica-leo moves only backward; but Mr Rouet has observed a species which moves forward in the common way of other animals, and makes no pit of this kind to entrap its prey, but seizes other insects by force.

FORMING is used for the act of giving being or birth to any thing.

The word is also simply used for giving the figure to any thing. The potter forms his vessels as he pleases. Geometry teaches how to form all kinds of figures.

It is likewise used for the producing of a thing: thus, the lineaments of the face began to be formed.

FORMING of a Siege, is the making lines of circumvallation to fortify the camp, and disposing things for the attack of a place in form.

They also say, to form a squadron or battalion; meaning, to range the soldiers in form of a squadron, &c.

FORMING the Line, is drawing up infantry, cavalry, and artillery, into line of battle. See LINE.

FORMING is also used in grammar, in speaking of certain tenses of verbs, which are made from others by a change of certain letters. The present tense is formed from the infinitive. Compound and derivative words also, and even all that have any etymology, are said to be formed.

FORMOSA, an island in the Pacific Ocean, between 119° and 122° of E. Long. and 22° and 25° N. Lat. about 100 miles east of Canton in China. It is subject to the Chinese; who, however, notwithstanding its vicinity, did not know of its existence until the year 1430. It is about 85 leagues in length, and 25 in breadth. A long chain of mountains, which runs from north to south, divides it into two parts, the eastern and western. The Dutch formed an establishment in the western part in 1634, and built the fort of Zealand, which secured to them the principal port of the island; but they were driven from thence in 1659 or 1661 by a celebrated Chinese pirate, who made himself master of all the western part, which afterwards submitted in 1682 to the authority of Kang-he emperor of China.

Formosa.

This western part of Formosa is divided into three distinct governments, all subordinate to the governor of TAI-OUAN, the capital of the island, who is himself subject to the viceroy of the province of FOKIEN.

This island presents extensive and fertile plains, watered by a great number of rivulets that fall from the eastern mountains. Its air is pure and wholesome; and the earth produces in abundance corn, rice, and the greater part of other grains. Most of the Indian fruits are found here, such as oranges, bananas, pine-apples, guavas, papaws, cocoa-nuts; and part of those of Europe, particularly peaches, apricots, figs, raisins, chest-nuts, pomegranates, water-melons, &c. Tobacco, sugar, pepper, camphire, and cinnamon, are also common. Horses, sheep, and goats, are very rare in this island: there are even few hogs, although these animals abound in China. Domestic poultry, such as fowls, geese, and ducks, are exceedingly plenty; pheasants also are sometimes seen; and monkeys and stags have multiplied so much, that they wander through the country in large flocks.

The inhabitants of Formosa rear a great number of oxen, which they use for riding, from a want of horses and mules. They accustom them early to this kind of service, and by daily exercise train them to go as well and as expeditiously as the best horses. These oxen are furnished with a bridle, saddle, and crupper. A Chinese looks as big and proud when mounted in this manner, as if he were carried by the finest Barbary courser.

Wholesome water fit for drinking is the only thing wanting in the island of Formosa. It is very extraordinary, that every kind of water in it is a deadly poison to strangers, for which no remedy has hitherto been found. "One of the governor's servants," says Father de Mailla, "whom I had in my train (a strong and robust man), trusting too much to the force of his constitution, would not believe what had been told him concerning this water: he drank some of it; and died in less than five days, after every medicine and antidote had been administered without success. There is none but the water of the capital which can be drunk: the mandarins of the place therefore always took care to transport a sufficiency of it in carts for our use." Our author adds, that at the bottom of a mountain a league distant from Fong-kan-hien, there is a spring that produces a stream, the water of which is of a whitish blue colour, and so noxious, that no one can approach it.

There are few mulberry-trees in Formosa, consequently little silk is made in the country. Numerous manufactures, however, would soon be introduced into it, were the Chinese permitted indiscriminately to transport themselves thither, and to form establishments in the island. Those who go to it must be protected by passports from the Chinese mandarins, and these passports are sold at a dear rate; securities are besides required. This is not all: when they arrive, money must be given to the mandarins who are appointed to examine those who enter or quit the island, and who generally discharge this duty with the most rigid severity. If they give no present, or offer only a trifle, they meet with little mercy; and are sure to be sent back, whatever passport they may have. The Chinese, through policy, connive at these exactions, to prevent

Formosa too great a number of people from emigrating to this island, which is rendered a place of great importance by its proximity to China. They fear, and with great reason (especially since Tartar emperors have been on the throne), that if any revolt should happen in Formosa, its influence might spread, and occasion great disturbance in the whole empire. On this account, the Tartars keep a garrison there of 10,000 men; which they take care to change every three years, or even oftener if they judge it necessary.

Besides the capital, the Chinese have also two other cities, and some villages, where they inhabit alone; for they do not permit the Indians, who are their subjects, to live among them; they suffer none to remain but those who are either their slaves or domestics. These Indians are united into 45 villages; 36 of which lie to the north, and 9 towards the south. The northern villages are very populous, and the houses are built almost after the Chinese manner. The habitations of the southern islanders are only heaps of huts or cottages of earth. In these huts they have neither chairs, benches, tables, beds, nor any piece of furniture; the middle part is occupied by a kind of hearth or chimney, raised two feet high, and constructed of earth, upon which they dress their victuals. Their ordinary food is rice, other small grain, and the game which they catch by coursing or kill with their arms. These islanders run with such surprising swiftness, that they can almost outstrip the fleetest greyhound. The Chinese attribute this agility to the precaution they take of confining their knees and reins by a close bandage until the age of 14 or 15. Their favourite arms are lances, which they dart to the distance of 60 or 80 feet with the greatest dexterity and precision. They use bows and arrows, and can kill a pheasant on wing with as much certainty as an European sportsman could with a fusée. These people are very dirty in their manner of eating. They have neither plates, dishes, nor spoons, nor even the small sticks used in China. Whatever they dress is placed on a plain board or mat, and they make use of their fingers for conveying it to their mouths. They eat flesh half raw; and provided it has been only presented to the fire, it appears to them excellent. Their beds are formed of fresh-gathered leaves. They go almost naked, and wear only a piece of cloth which hangs from their girdle to their knees. Those among them who, according to the judgment of the chiefs of the village, have borne away the prize for agility in running or dexterity in the chase, obtain the honourable privilege of making on their skin, by a very painful operation, several fantastical figures of flowers, trees, and animals. All have the right of blackening their teeth, and of wearing ornaments of bracelets and crowns made of shells and crystal.

The islanders who inhabit the northern part, where the climate is something colder, clothe themselves with the skins of the stags which they kill in hunting. They make a kind of dress of them without sleeves, that pretty much resembles a dalmatic, or vestment worn at the altar by the Roman clergy. They wear on their heads caps in the form of a cylinder, made of palm-leaves, and ornamented with several crowns placed one above another, on the top of which they fix plumes composed of the feathers of a cock or pheasant.

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The marriage ceremonies of the inhabitants of Formosa approach near to the simple laws of nature. They neither purchase, as in China, the women whom they espouse, nor does interest ever preside over their unions. Fathers and mothers are scarcely ever consulted. If a young man has a mind to marry, and has fixed his affection on a young girl, he appears for several days following near the place where she lives with a musical instrument in his hand. If the young woman is satisfied with the figure of her gallant, she comes forth and joins him: they then agree, and settle the marriage-contract. After this they give notice to their parents, who prepare a wedding-dinner, which is always given in the house where the young woman resides, and where the bridegroom remains without returning again to his father. The young man afterwards considers the house of his father-in-law as his own. He becomes the whole support of it, and he has no farther connection with that of his father; like married women in Europe, who generally quit their paternal home in order to live with their husbands. These islanders therefore seldom offer up vows for obtaining male children: they prefer daughters, because they procure them sons-in-law, who become the supports of their old age.

Although the Formosans are entirely subjected to the Chinese, they still preserve some remains of their ancient government. Each village chooses three or four old men from among those who have the greatest reputation for probity. By this choice they become the rulers and judges of the rest of the hamlet. They have the power of finally determining all differences; and if any one should refuse to abide by their judgment, he would be immediately banished from the village, without hopes of ever being able to re-enter it, and none of the inhabitants would afterwards dare to receive him.

The natives pay in grain the tribute imposed on them by the Chinese. To regulate every thing that concerns the laying on and collecting of this impost, government have established a Chinese in every village, who is obliged to learn the language, and act as interpreter to the mandarins. These interpreters are most cruel extortioners to the miserable people, whom they ought rather to protect: they are such insatiable leeches, that they can scarcely ever be satisfied. This daily and domestic tyranny has already caused the defection of three villages in the southern part of the island, where formerly there were twelve. The inhabitants of these villages revolted, expelled their interpreters, refused to pay tribute any longer to the Chinese, and have united themselves to the independent nation in the eastern part of the island.

It was in the island of Formosa that John Struys affirms to have seen with his own eyes a man who had a tail more than a foot in length, covered with red hair, and greatly resembling that of an ox. This man with a tail said, that his deformity, if it was one, proceeded from the climate, and that all those of the southern part of the island were born with tails like his.—But John Struys is the only author who attests the existence of this extraordinary race of men; no other writer who has spoken of Formosa makes the least mention of them. Another circumstance, no less singular, and which appears to be little better authenticated,

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ted, is, that in this island women are not permitted to bring forth children before they are 35, although they are at liberty to marry long before that age. Rechteren * thus expresses himself concerning this strange custom :

* *Dutch East India Company Voyages*, vol. v. p. 96.

"When women are first married, they bring no children into the world; they must, before that is permitted, have attained the age of 35 or 37. When they are big with child, their priestesses pay them a visit, and tread on their bellies with their feet, if it be necessary, and make them miscarry, with perhaps greater pains than they would have in being brought to bed. It would be not only a shame, but an enormous crime, to bring forth a child before the term prescribed. I have seen some females who had already destroyed the fruit of their womb 15 or 16 times, and who were big for the 17th when it was lawful for them to bring forth a living child."

To our description of Formosa we shall add the following account of the dreadful disaster that lately befel this unhappy island. The details were conveyed by a letter from Peking, addressed to M. Bertin, and dated the 14th of July 1782.

"The waters of the ocean have well nigh deprived China of one of its most valuable maritime possessions. The island of Tay-ouan, known in Europe by the name of Formosa, has been almost swallowed up by them. It has been reported here, that part of the mountain which divides the island has sunk and disappeared; that the rest has been overturned; and that the greater part of the inhabitants have perished. Such have been for some days the popular reports in this capital. Government, however, has put a stop to them, by informing the public of the real truth; such as it is has been announced to the emperor by the officers who have this small portion of his territories under their jurisdiction. I cannot do better than transcribe what they have written. The dispatches of the Chinese officers, addressed to the emperor, run thus :

"Bechen, governor-general of the provinces of Fokien and Tche-Kyang-ya, viceroy of Fokien, and others, make known to your majesty the disaster that has lately befallen the island of Tay-ouan. Mon-ha-hon, and other principal officers of this island, have acquainted us, that on the 21st of the fourth moon (May 22d, 1782), a most furious wind, accompanied with heavy rain and a swell of the sea greater than ever remembered, had kept them under continual apprehension of being swallowed up by the waves, or buried in the bowels of the earth, from the hour of *yn* until the hour *ouei* (A). This dreadful tempest seemed to blow at the same time from the four cardinal points of the compass, and continued with equal violence during the above mentioned time. The buildings where the tribunals were held, the public granaries, the barracks, salt-warehouses, and works, have been totally destroyed, and every thing they contained is lost: warehouses and work-shops, as well as private houses, for the most part, present nothing but ruins and heaps of rubbish. Of 27 ships of war which were in the harbour 12 have disappeared; two others have been dashed to pieces,

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and 10 are shattered in such a manner that they are rendered entirely unfit for service; other smaller vessels of different sizes, above 100 in number, have shared the same fate; eighty have been swallowed up; five others, which had just taken in a lading of rice for Fokien, have sunk, and their cargoes, which amounted to 100,000 bushels, are wholly lost. With regard to other vessels, whether small or great, which had not entered the harbour, 10 or 12 of the largest are reckoned to have been swallowed up; those of inferior size, as well as a prodigious number of barks, boats, and other small vessels of different kinds, have disappeared, without leaving the least piece of wreck behind them. As the whole island has been covered with water, the provisions have been either swept away or spoilt, so as to render them prejudicial to the health of those who use them in their present state. The crops are entirely lost. When we shall have been informed of particulars, we shall not fail to give your majesty the earliest intelligence of them.—After having received this letter from Mon-ha-hon, and the other principal officers residing at Tay-ouan, I employed the utmost diligence to give every assistance in my power to this unfortunate island; and I ordered the travelling commissary, and Trey-ouer, general of the province, to get particular information of the number of those who have perished, of the houses destroyed, and of the quantity of salt and other provisions that has been lost: I have likewise enjoined them to rebuild with the utmost expedition the tribunals, granaries, and other public edifices; to dispatch proper persons to search for the vessels and ships that have disappeared; to repair those which are not altogether unfit for service, and to send immediately to the neighbouring countries for salt and other necessary provisions; but above all, to ascertain in the most accurate manner the different losses sustained by the inhabitants, and the precise number of people that have perished, in order that I may be able to give the fullest information to your majesty."

"The emperor of China caused a particular detail of these losses to be published, together with the following letter:

"Tchang-yu, &c. Tchem-hoei-Thon-Tsong-tou of Fokien, and others, have informed me of the dismal event that hath taken place in the island of Tay-ouan, which is a district of the province of Fokien. They have written to me, that on the 21st of the fourth moon. [Here the emperor repeats what is contained in the preceding letter, and continues thus]: I command Tsong-tou to get the best information he can of the different losses sustained by the inhabitants of the island, and to transmit the particulars to me, in order that I may give them every assistance to repair them. My intention is, that all the houses which have been thrown down shall be rebuilt entirely at my expence; that those be repaired which are only damaged; and that provisions, and every thing which the people stand in immediate want of, be supplied them. I should feel much pain, were even one among them to be neglected: I therefore recommend the utmost di-

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(A) The hours of the Chinese are double ours: the hour *yn* begins at three in the morning and ends at five; *ouei* begins at three in the afternoon and ends at five.

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ligence and strictest inquiry, as I am desirous that none of my subjects should entertain the least doubt of the tender affection which I have for them; and that they should know that they are all under my eyes, and that I myself will provide for their wants. With regard to my ships of war, tribunals, and public edifices, let them be restored to their former state with money taken from the public treasury, and let the general account of the whole expence be laid before me."

The missionary who sent this account farther says, From these letters it evidently appears, that this disaster happened in consequence of an earthquake; but he adds, that the volcano which occasioned it must be at a prodigious depth below the sea. He does not pretend to give an explanation of it; he is contented with observing, that the same scene seems to have passed at the island of Formosa as at Lima and Lisbon.

FORMULA, or FORMULARY, a rule or model, or certain terms prescribed or decreed by authority, for the form and manner of an act, instrument, proceeding, or the like.

FORMULA, in church-history and theology, signifies a profession of faith.

FORMULA, in medicine, imports the constitution of medicines, either simple or compound, both with respect to their prescription and consistence.

FORMULARY, a writing, containing the form or formula of an oath, declaration, attestation, or abjuration, &c. to be made on certain occasions.

There are also formularies of devotion, of prayers, &c. Liturgies are formularies of the public service in most churches.

FORNACALIA, or FORNICALIA, in Roman antiquity, a festival instituted by Numa, in honour of Fornax, the goddess of ovens; wherein certain cakes were made, and offered in sacrifice before the ovens.

FORNICATION (*Fornicatio*, from the *fornices* in Rome, where the lewd women prostituted themselves for money), is whoredom, or the act of incontinency, between single persons; for if either of the parties is married, it is *adultery*. Formerly court-wards had power to inquire of and punish fornication and adultery; in which courts the king had a fine assessed on the offenders, as appears by the book of Domestday.

In the year 1650, when the ruling powers found it for their interest to put on the semblance of a very extraordinary strictness and purity of morals, not only incest and wilful adultery were made capital crimes, but also the repeated act of keeping a brothel, or committing fornication, were (upon a second conviction) made felony without benefit of clergy. But, at the restoration, when men, from an abhorrence of the hypocrisy of the late times, fell into a contrary extreme of licentiousness, it was not thought proper to renew a law of such unfashionable rigour. And these offences have been ever since left to the feeble coercion of the spiritual court, according to the rules of the canon law; a law which has treated the offence of incontinence, nay, even adultery itself, with a great degree of tenderness and lenity; owing perhaps to the constrained celibacy of its first compilers. The temporal courts therefore take no cognisance even of the crime of adultery otherwise than as a private injury. See ADULTERY.

The evils of fornication, which too many wish to

consider as no sin, may be judged of from the following particulars.

1. The malignity and moral quality of each crime is not to be estimated by the particular effect of one offence, or of one person's offending, but by the general tendency and consequence of crimes of the same nature. In the present case, let the libertine consider and say, what would be the consequence, if the same licentiousness in which he indulges were universal? or what should hinder its becoming universal, if it be innocent or allowable in him?

2. Fornication supposes prostitution; and by prostitution the victims of it are brought to almost certain misery. It is no small quantity of misery in the aggregate, which, between want, disease, and insult, is suffered by those outcasts of human society who infest populous cities; the whole of which is a general consequence of fornication, and to the increase and continuance of which every act and instance of fornication contributes.

3. Fornication produces habits of ungovernable lewdness, which introduce the more aggravated crimes of seduction, adultery, violation, &c. The criminal indulgences between the sexes prepare an easy admission for every sin that seeks it: they are, in low life, usually the first stage in mens progress to the most desperate villanies; and in high life, to that lamented dissoluteness of principle, which manifests itself in a profligacy of public conduct, and a contempt of the obligations of religion and moral probity.

4. Fornication perpetuates a disease, which may be accounted one of the worst maladies of human nature, and the effects of which are said to visit the constitution of even distant generations.

The passion being natural, proves that it was intended to be gratified; but under what restrictions, or whether without any, must be collected from different considerations.

In the Scriptures, fornication is absolutely and peremptorily condemned. 'Out of the heart proceed evil thoughts, murders, adulteries, fornication, thefts, false witness, blasphemies; these are the things which defile a man.' These are Christ's own words; and one word from him upon the subject is final. The apostles are more full upon this topic. One well-known passage in the Epistle to the Hebrews may stand in the place of all others; because, admitting the authority by which the apostles of Christ spake and wrote, it is decisive. 'Marriage and the bed undefiled is honourable amongst all men, but whoremongers and adulterers God will judge;' which was a great deal to say, at a time when it was not agreed even amongst philosophers that fornication was a crime.

Upon this subject Mr Paley adds the following observations*.

"The Scriptures give no sanction to those austerities which have been since imposed upon the world under the name of Christ's religion, as the celibacy of the clergy, the praise of perpetual virginity, the *prohibitio concubitus cum gravida uxore*; but with a just knowledge of, and regard to the condition and interest of the human species, have provided in the marriage of one man with one woman an adequate gratification for the propensities of their nature, and have restrained them to that gratification.

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* Moral and
Political
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p. 246.

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"The avowed toleration, and in some countries the licensing, taxing, and regulating of public brothels, has appeared to the people an authorizing of fornication, and has contributed, with other causes, so far to vitiate the public opinion, that there is no practice of which the immorality is so little thought of or acknowledged, although there are few in which it can more plainly be made out. The legislators who have patronized receptacles of prostitution ought to have foreseen this effect, as well as considered, that whatever facilitates fornication, diminishes marriages. And as to the usual apology for this relaxed discipline, the danger of greater enormities if access to prostitutes were too strictly watched and prohibited; it will be time enough to look to that, after the laws and the magistrates have done their utmost. The greatest vigilance of both will do no more, than oppose some bounds and some difficulties to this intercourse. And after all, these pretended fears are without foundation in experience. The men are in all respects the most virtuous in countries where the women are most chaste.

"If fornication be criminal, all those incentives which lead to it are accessaries to the crime; as lascivious conversation, whether expressed in obscene or disguised under modest phrases; also wanton songs, pictures, books; the writing, publishing, and circulating of which, whether out of frolic or for some pitiful profit, is productive of so extensive a mischief from so mean a temptation, that few crimes within the reach of private wickedness have more to answer for, or less to plead in their excuse.

"Indecent conversation, and by parity of reason all the rest, are forbidden by St Paul, Eph. iv. 29. 'Let no corrupt communication proceed out of your mouth;' and again, Col. iii. 8. 'Put filthy communication out of your mouth.'

"The invitation or voluntary admission of impure thoughts, or the suffering them to get possession of the imagination, falls within the same description, and is condemned by Christ, Matt. v. 28. 'Whosoever looketh on a woman to lust after her, hath committed adultery with her already in his heart.' Christ, by thus enjoining a regulation of the thought, strikes at the root of the evil."

FORNIX, in anatomy, is part of the corpus callosum in the brain; so called, because of a distant resemblance it hath to the arches of ancient vaults when viewed in a particular manner.

FORRAGE, in the military art, denotes hay, oats, barley, wheat, grass, clover, &c. brought into the camp by the troopers, for the sustenance of their horses.

It is the business of the quarter-master general to appoint the method of forrage, and post proper guards for the security of the foragers.

FORRES, a parliament town of Scotland in the county of Murray, classing with Inverness, Fortrose, and Nairn. It is a small well-built town, pleasantly situated on an eminence near the river Findhorn. The country about it has a cheerful appearance, having a few gentlemens seats, with some plantations about them. On a hill west of the town are the remains of a castle; and a melancholy view of a number of sand-hills, that now cover that tract of land which was formerly the estate of a Mr Cowden in the parish of Dyke. This inundation was occasioned by the influx

of the sea and the violence of the wind. It had been the custom to pull up the bent, a long spiry grass near the shore, for litter for horses, by which means the sand was loosened, and gave way to the violence of the sea and wind, which carried it over several thousand acres of land. The people having been prevented from pulling up any more of the grass, the progress of the sand is now nearly stopped, and the sea has retired; but the wind has blown some of the sand from the hills over Colonel Grant's land, and destroyed near 100 acres. A sand-bank, which is all dry at low-water, runs out from this place for several miles into the Murray-Firth. Some of the land, which has been long forsaken by the water, is now beginning to be useful again, and is turned into grazing land. At Forres, coarse linen and sewing thread are made. About a mile from the town, on the left-hand side of the road, is a remarkable obelisk, said to be the most stately monument of the Gothic kind to be seen in Europe. It has been the subject of many able pens; but totally overlooked by Dr Johnson, who says, "At Forres we found good accommodation, but nothing worthy of particular remark."—It is thus described by Mr Cordiner, in a letter to Mr Pennant: "In the first division, underneath the Gothic ornaments at the top, are nine horses with their riders, marching forth in order: in the next is a line of warriors on foot, brandishing their weapons, and appear to be shouting for the battle. The import of the attitudes in the third division is very dubious, their expression indefinite. The figures which form a square in the middle of the column are pretty complex but distinct; four serjeants with their halberds guard a company, under which are placed several human heads, which have belonged to the dead bodies piled up at the left of the division: one appears in the character of executioner severing the head from another body; behind him are three trumpeters sounding their trumpets, and before him two pair of combatants fighting with sword and target. A troop of horse next appears, put to flight by infantry, whose first line have bows and arrows; the three following, swords and targets. In the lowermost division now visible, the horses seem to be seized by the victorious party, their riders beheaded, and the head of their chief hung in chains or placed in a frame; the others being thrown together beside the dead bodies under an arched cover. The greatest part of the other side of the obelisk, occupied by a sumptuous cross, is covered over with an uniform figure, elaborately raised, and interwoven with great mathematical exactness. Under the cross are two august personages, with some attendants, much obliterated, but evidently in an attitude of reconciliation; and if the monument was erected in memory of the peace concluded between Malcolm and Canute, upon the final retreat of the Danes, these large figures may represent the reconciled monarchs. On the edge below the fretwork are some rows of figures joined hand-in-hand, which may also imply the new degree of confidence and security which took place, after the feuds were composed, which are characterized on the front of the pillar. But to whatever particular transaction it may allude, it can hardly be imagined, that in so early an age of the arts in Scotland as it must have been raised, so elaborate a performance would have been undertaken but in consequence of an event

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Forskohlea
"Vitrified
Forts."

of the most general importance; it is therefore surprising, that no distinct traditions of it arrived at the era when letters were known. The height of this monument (called *King Sueno's stone*) above the ground is 23 feet; besides 12 or 15 feet under ground. Its breadth is 3 feet 10 inches by 1 foot 3 inches in thickness."

FORSKOHLEA, in botany: A genus of the pentagynia order, belonging to the decandria class of plants. The calyx is pentaphyllous, and longer than the corolla. There are ten petals spatulated, *i. e.* roundish before, with a linear base.

FORSTERA, in botany: A genus of the triandria order, belonging to the gynandria class of plants. The perianthium is double; the exterior one beneath three-leaved; the interior one above, and six-cleft; the corolla tubular.

FORT, in the military art, a small fortified place, environed on all sides with a moat, rampart, and parapet. Its use is to secure some high ground, or the passage of a river, to make good an advantageous post, to defend the lines and quarters of a siege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with bastions, others with demi-bastions. Some again are in form of a square, others of a pentagon. A fort differs from a citadel, as this last is built to command some town.

Vitrified Forts, a very singular kind of structures found in the highlands and northern parts of Scotland, in which the walls have the appearance of being melted into a solid mass, so as to resemble the lava of a volcano, for which indeed they have been taken by several persons who have visited them.

These walls were taken notice of by Mr Williams an engineer, who wrote a treatise upon the subject, and was the first who supposed them to be the works of art; other naturalists having attributed them to a volcanic origin. These works are commonly situated on the tops of small hills, commanding an extensive view of the adjacent valley or low country. The area on the summit, varying, as is supposed, according to the number of cattle the proprietor had to protect, or the dependents he was obliged to accommodate, is surrounded with an high and strong wall, of which the stones are melted, most of them entirely; while others, in which the fusion has not been so complete, are sunk in the vitrified matter in such a manner as to be quite inclosed with it; and in some places the fusion has been so perfect, that the ruins appear like masses of coarse glass. Mr Williams has not only absolutely determined the walls in question to be the works of art, but has even hazarded a conjecture as to the manner in which they were constructed, and which, according to him, was as follows. Two parallel dikes of earth or sod being raised, in the direction of the intended wall, with a space between them sufficient for its thickness, the fuel was put in, and set on fire. The stones best adapted for the purpose, called the *plum-pudding stone*, are every where to be found in the neighbourhood. These were laid on the fuel, and when melted, were kept by the frame of earth from running off; and by repeating the operation, the wall was raised to a sufficient height. This opinion of the stones being thrown in without any order, is thought to be con-

firmed by the circumstance of there not being any where a large one to be seen, nor a stone laid in any particular direction, nor one piece which has not in some degree been affected by the fire. Mr Williams mentions a fact tending to confirm his hypothesis, viz. of a brick kiln situated on the declivity of an eminence, so as to be exposed to the wind, which happening to rise briskly one time when the kiln was burning, so increased the heat, that the bricks were melted, and ran, like a lava, for a considerable way down the hill.

The opinion of Mr Williams has been embraced by several other authors; particularly Mr Freebairn and Dr Anderson, the latter having published two treatises upon these buildings in the *Archæologia*. In the same work, however, we meet with a paper by the Hon. Daines Barrington, in which the author expresses quite different sentiments. He observes, that Mr Williams, and the other antiquaries, who suppose the walls in question to be the works of art, imagine that the reason of their being constructed in this manner was the ignorance of cement, which in these remote ages prevailed in Scotland: but with respect to this circumstance, he says, that if one side of the wall only was heated, and that to any considerable height, the matter in fusion would in all likelihood drop down to the bottom, without operating as any cement to the loose stones thrown in amongst it. This circumstance of the walls being vitrified only on one side, is indeed remarkable, and takes place in most of the forts of this kind to be met with at present: but with regard to it, Mr Barrington observes, that he himself has been twice in the Highlands of Scotland, and has found very few hills of any height which were clothed with wood; the trouble therefore of carrying it up to the top of such a mountain would be very considerable. But to this it might easily be replied, that we cannot by any means argue from the present state of the hills in the Highlands to their state in a very remote period of antiquity. At that time, it is neither impossible nor in the least improbable, that most of the hills in Scotland were overgrown with wood; or at any rate, there undoubtedly was plenty of peat, which is still used as fuel in Scotland, and which affords such a strong heat as to be advantageously employed in smelting iron*, as we are informed by M. Magellan. A third particular mentioned by Mr Williams is, that these inclosures were intended as places of defence; and in support of this opinion alleges, that there are dried wells found within most of them. But on this Mr Barrington observes, that shelter from the weather was also necessary "upon the top of a bleak Scotch hill, whilst whisky (or a succedaneum for it) would be often in greater request than the bare element of water." This objection, however, as well as the last, is evidently very frivolous; for these buildings might have roofs as well as any other; and whatever necessity there might be for whisky occasionally, water was certainly an indispensable requisite.

Mr Barrington having thus given his reasons for dissenting from the opinion of Mr Williams and the antiquaries just mentioned, proceeds to state his own. He tells us, that having travelled for 21 years the most mountainous circuit in Wales, he has frequently observed inclosures of dry stones, particularly

Vitrified
Forts.

* See the
article Peat.

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larly a long tract in the western part of Merionethshire, called in the language of the country *Duffryn*, i. e. *the vale*. On first viewing these small inclosures, made with walls of thick stones, he was at a loss to imagine how it could be worth while to construct such strong fences for so inconsiderable a piece of ground as they inclosed; but, on examining the adjacent country, he found it almost entirely covered with stones of a similar kind; and, of consequence, the smaller the space to be cleared, the less expensive would be the removal. "For the same reason (says he), such dry walls are often of a great thickness, and sometimes the corners of the inclosures are filled with stones to a great width, this being the only possible means of procuring pasture." To a practice of the same kind our author would ascribe the origin of the works in question: but the objection occurs very strongly, that the walls in Scotland are vitrified, and it is not to be supposed that such trouble would be taken with fences made in such a fortuitous manner. This objection, our author owns, would indeed be unanswerable, on the supposition that the vitrification was made on purpose to strengthen the walls of the fortresses; "but (says he) may not the vitrification have been occasioned by volcanoes, or by what are called *bloomeries*? The same effect may be produced likewise on dry walls of stone by lightning passing along them. The loose stones in either case would not be rejected because they were glassy, and would be piled up in the fence of the inclosure; as the great point upon these occasions is to clear the ground, and remove the incumbering stones to the smallest distance. One of the advocates for the designed and not fortuitous vitrification, says, that the pieces he had procured did not resemble what is called *lava*. But every volcano is not necessarily an Etna or a Vesuvius; and consequently the matter disgorged from the crater must perpetually vary both in substance and form. Vitrified masses, larger or smaller, will likewise be produced by the same means. It may be contended indeed, that pasture thus procured, by clearing the ground, would be more convenient at the bottom or on the sides, than on the top of the hill: but to this I answer, that in rocky countries you must get what pittance you can of soil, and often it will happen that the only detached and removeable stones are on the summit. When such inclosures have been made, they became very convenient for putting cattle into; and hence perhaps some of the wells which Mr Williams hath mentioned."

Our author concludes his dissertation on this subject by observing, that if vitrification answered the purpose of cement, it is very extraordinary that the ancient inhabitants of Scotland did not apply it to the houses or huts in which they constantly lived, but reserved this troublesome and expensive process merely for a fortification, which might not perhaps be used in half a century against an enemy. On this it is almost superfluous to observe, that in the ages of barbarity and bloodshed, in which these inclosures, whether natural or artificial, were supposed to be used as fortresses, war was so frequent, that a defence against an enemy might seem to be necessary every day, instead of once in half a century. Before we proceed further in the argument, however, it will be necessary to give some

account of the situation and appearance of these fortresses.

According to Mr Cardonnel, the largest of them is situated on the hill of Knockfarril, to the south of the valley of Strathpeffer, two miles west from Dingwall in Ross-shire. The inclosure is 120 feet long and 40 broad within the walls; strengthened on the outside with works at each end. A range of habitations seem to have been erected against, or under, the shade of the outward wall; of which those on the south-side seem to have been higher and larger than those on the north. There are two wells in the middle, which, on being cleared out, filled with water. On the skirts of the hill to the south are many detached buildings; which, from the stratum of dung found on removing the ruins, appear plainly to have been used for securing the cattle. This place seems to have been anciently of consequence, and the residence of some powerful chief, from a road which leads through the hills to the north-west sea. To the east of the works are a number of vitrified ruins, extending for a considerable way along the ridge of the hill. The end next the fort seems to have joined the outer wall, and consisted either of two parallel walls, closed above, with a passage between them under cover, or a high wall broad enough to walk on. In this wall there is the vestige of a break about the middle, over which a bridge has been laid, to be drawn up or removed as occasion might require.

The fort next in consequence to that of Knockfarril is situated on the hill of Craig-Phadrack near Inverness, "which (says Mr Cardonnel) has this peculiar circumstance, that there appears to have been two vitrified walls quite round the area. The inner one seems to have been very high and strong; the outer wall but low: probably the space between was intended for securing their cattle, as there are no remains of dry-stone buildings, such as are found near the rest. Several parts of this outer wall appear quite entire, sticking to the firm bare rock, where it was first run. The area within the inner wall is near 80 paces long, and 27 broad." Of this we have an account† by Alexander Fraser-Tytler, Esq; professor of civil history in the university of Edinburgh, who visited it in the year 1782. The hill itself is a small conical eminence, forming the eastern extremity of that ridge of mountains which bounds Loch-Ness on the north-west side. It is situated about a mile to the north of Inverness, and is accessible on two different quarters, viz. the west and south-east; the former affording entrance by a narrow level ridge joining the hills on Loch-Ness, and the latter by an easy ascent from the high ground above Inverness. On approaching the hill from the west, we first meet with a road cut through the rock from the bottom to the top, in most places 10 feet broad and nearly as deep; winding, for about 70 feet, with an easy serpentine direction, by which we gain an ascent over a steep rock otherwise quite inaccessible from that quarter. This road, in our author's opinion, is undoubtedly the work of art, and the vitrified matter on the top is the only thing which indicates the effect of fire; there being neither an appearance of pumice stone, lava, nor basalt about the hill otherwise. There is indeed plenty of plum-pudding-stone; which

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which some have supposed to be of the nature of volcanic tufa: but this opinion is rejected by our author as erroneous. "But the circumstance (says he) which in my apprehension evinces, in the most satisfactory manner, that these appearances of the effect of fire on the summit of this hill are not the operation of nature but of art, is the regular order and disposition of those materials; the form of the ground, and the various traces of skill and contrivance which are yet discernible, though considerably defaced either by external violence or the obliterating hand of time." To investigate this matter regularly, he begins with the winding road already mentioned, and which is evidently cut through the rock for the purpose of gaining an easy ascent from the level ridge to the summit, which would otherwise have been impracticable. In ascending by this road, there appears, towards the middle, on the right hand, a small platform overhanging the passage, and inclining by a very gentle declivity to the very edge of the rock. Four enormous stones are placed upon the platform, and on the edge and extremity of it, which have evidently been guided by art into that position; it being impossible that they could have rested there, had they been rolled down from the higher parts. The obvious reason for placing them in such a position has been, that on an alarm of danger they might be projected into the path below, which could be done by the efforts of a very few men; and when this was done, the passage would be entirely obstructed, or at least rendered so difficult that it could be defended by a few against any number of assailants. Some other large stones are placed on an eminence to the left, probably with a view to block up an hollow channel, by which an enemy might have attempted to ascend. When we come to the top of the hill, a few feet below the rampart which crowns the whole, there appears an outward wall, approaching on the sides of the hill so near the upper rampart, as to have only a trench of 10 or 12 feet wide between them. This outward wall is in some places so low as to be almost level with the rock, though in other places it rises to the height of two or three feet; but even where lowest, it may be traced by a line of vitrified matter sticking fast to the rock all along, and nearly of the same breadth, which is about nine feet. The remains of this wall are strongly vitrified, except in one place on the north side, where, for about 70 yards, the rampart is formed only of dry stones and earth. At the east side, where the hill is more accessible, there is a prodigious mound of vitrified matter, extending itself to the thickness of above 40 feet. At the south-east corner, and adjoining to this immense mound, is an outwork, consisting of two semicircular vitrified walls, with a narrow pass cut through them in the middle: which appears to have been another, and perhaps the principal, entry to the fort.

The inner wall, surrounding the summit of the hill, incloses an oblong level area of about 75 yards long and 30 broad, rounded at each of the ends like the outward wall. It is of considerable height, and nearly of the same thickness with the outward one.—It has some appearance of having been defended with four turrets or bastions: but the traces are so imperfect, that Mr Tytler does not lay much stress on his observations in this respect; a number of small tumuli

of earth, with a stone in the centre, were more discernible. On the east-side a portion of the internal space appears separated from the rest by two ranges of stones fixed strongly in the earth, and forming a right-angled parallelogram. "This separation (says our author) is immediately discernible by the eye, from this circumstance, that the whole of the inclosed summit has been most carefully cleared from stones, of which there is not one to be seen, unless those that form this division, and the single one in the middle of the circle of tumuli above mentioned. What has been the design of this separated space, it is difficult to conjecture. It might perhaps have marked the residence of those of a higher rank, or served as a temple for the purposes of devotion." On the east end of the large area on the summit is a well of about six feet in diameter, which has probably been sunk very deep in the rock, though now it is filled up with rubbish to within a yard of the top.

The other fortified hills mentioned by Mr Cardonnel are those of Dun-Evan in the shire of Nairn; Torduncastle, near Fort Augustus; and another on the west side of Glenéves in Lochaber, three miles to the south of Fort William. The Castle-hill of Finhaven, in the county of Angus, has likewise some considerable ruins of the same kind.

Dun-Evan and the hill of Finhaven have likewise been visited by Mr Tytler, who gives an account of them in the paper already quoted; of which the following is an abstract. "On the summit of the hill of Dun-Evan, whose name implies that it had been originally a place of defence, are the remains of two walls surrounding an oblong space like that of Craig-Phadrack already described, but somewhat smaller in size. [Mr Cardonnel says that it is about 70 paces long and 30 broad]. There are likewise the traces of a well in the inclosed area; and at the east end are the remains of a prodigious mass of building, much more extensive than that on Craig-Phadrack." Here, however, our author could not perceive any marks of fire; and Mr Williams owns that the vitrified ruins here are more wasted than on Knockfarril or Craig-Phadrack. But with regard to the vitrifications here, our author is inclined to suppose Mr Williams to have been entirely in a mistake. On the Castle-hill of Finhaven, however, the vitrified remains are very visible all round the summit, which is cleared of stones and levelled, unless at one end, where there is a great hollow space separated from the rest of the area, and probably destined exclusively for the keeping of cattle. The inclosed area is about 140 yards long and upwards of 40 broad.

Besides these fortifications, the hill of Noth affords a remarkable appearance of the same kind: of which Mr Cordiner gives the following description, not from his own observation, but those of a gentleman of credit who visited the place. "On the top of the hill there is an oblong hollow, as I could guess, of about an English acre, covered with a fine sward of grass: in the middle toward the east end of this hollow is a large and deep well. The hollow is surrounded on all sides with a thick rampart of stones. On three sides of this rampart, from 8 to 12 feet thick, is one compact body of stones and minerals which have been in a state of fusion, resembling a mixture of stone and

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iron-ore, all vitrified, calcined, and incorporated. On the north side, the rampart consists of broken pieces of rock, which have the appearance of having been torn to pieces by some extraordinary violence. If the calcined compact wall exists under them, it is not at present visible."

Such are the descriptions of the most remarkable of these curious fortifications, which of late seem to have engaged the attention of the learned in a considerable degree. We have already taken notice, that by some they are supposed to be the works of art, by others the productions of a volcano. Mr Cardonnel adopts the opinion of Mr Williams as the most probable, both with respect to their use and manner of construction. Mr Tytler takes notice of the remarkable difference of opinion among those who have viewed the places in question. "It is curious to remark (says he) how the same appearances, to different observers, lead to the most opposite opinions and conclusions. The two gentlemen above-mentioned (Mr Williams and Dr Anderson), seem not to have entertained the smallest doubt, that the vitrified materials on the tops of these hills were the vestiges of works of art, and the remains of structures reared for the purposes of security and defence. The bishop of Derry, when on a tour to the north of Scotland, visited the hill of Craig-Phadrick near Inverness, and expressed his opinion, that the mounds of vitrified matter were not the remains of any artificial work, but the traces of an ancient volcano. In the Phil. Transf. of the Royal Society of London for 1777, Part II. n^o 20. is an account of *Creck Faterick*, there termed a *Volcanic hill near Inverness*, in a letter from Thomas West, Esq; to Mr Law, F. R. S. in which the writer does not hesitate to pronounce this hill an extinguished volcano: and having sent specimens of the burnt matter for the inspection of the Royal Society, the secretary subjoins a note to the paper, intimating, that these specimens having been examined by some of the members well acquainted with volcanic productions, were by them judged to be real lava. Such was likewise the opinion of the late Andrew Crosbie, Esq; who, in an account which he gave to the Philosophical Society of Edinburgh in 1780, offered some very curious conjectures with regard to the process of nature, by which he supposed the whole of this hill to have been thrown up from the bottom of the sea by the operation of intestine fire.

Mr Tytler agrees with those who think the vitrified structures to be artificial works; but he differs from Mr Williams and others, who think that they were vitrified on purpose for cementing the materials together. His reason for this is, that the number of forts that show marks of vitrification is inconsiderable when compared with those that do not. He therefore considers the vitrification as accidental; and that it must have been accomplished in the following manner. In the rude state in which we must suppose Scotland to have been in early times, it is very probable that their buildings, both for habitation and defence, would be frequently constructed of loose stones of an irregular shape; of which, by themselves, it would scarce be possible to fabricate a wall of any tolerable strength. Hence it became necessary to use wood as well as stone in their construction. This kind of building then, in our au-

thor's opinion, was begun by raising a double row of palisades or strong stakes in the form of the intended structure, in the same way as in that ancient mode of building described by Palladio under the name of *riempita a cassa*, or coffer-work. These stakes were probably warped across by boughs of trees laid very closely together, so as to form two fences running parallel to each other at the distance of some feet, and so close as to confine all the materials of whatever size that were thrown in between them. Into this intermediate space Mr Tytler supposes were thrown boughs and trunks of trees, earth and stones of all sizes, large or small as they could quarry or collect them. Very little care would be necessary in the disposition of these materials, as the outward fence would keep the mound in form. In this way it is easy to conceive that a very strong bulwark might be reared with great dispatch; which, joined to the natural advantage of a very inaccessible situation, and that improved by artful contrivances for increasing the difficulty of access, would form a structure capable of answering every purpose of security or defence. The most formidable attack against such a building would be fire, which would no doubt be always attempted, and often with success, by an enemy who undertook the siege. If the besiegers prevailed in gaining an approach to the ramparts, and, surrounding the external wall, set fire to it in several places, the conflagration must speedily have become universal, and the effect may be easily imagined. If there happened to be any wind at the time to increase the heat, the stony parts could not fail to come into fusion; and as the wood burnt away, sinking by their own weight into a solid mass, there would remain a wreck of vitrified matter tracking the spot where the ancient rampart had stood; irregular, and of unequal height, from the fortuitous and unequal distribution of the stony materials of which it had been composed. This conjecture appears very probable from their appearance at this day. They do not seem to have ever been much higher than they are at present, as the fragments that have fallen from them, even where the wall is lowest, are very inconsiderable. The durable nature of the materials would prevent them from suffering any changes by time; though, from the gradual increase of the soil, they must in some places have lost considerably of their apparent height, and in others been quite covered. Mr Williams, in making a cut through the ramparts at Knockfarril, found in many places the vitrified matter covered with peat-moss half a foot thick.

In confirmation of this opinion, our author likewise urges, that in the fortification on Craig Phadrick, a large portion of the outward rampart bears no marks of vitrification. The reason of this seems to be, that the steepness of the hill on that side renders a low fence of stones and turf sufficient; and no wood had probably been employed in its construction. "It appears therefore highly probable (concludes our author), that the effect of fire upon these hill-fortifications has been entirely accidental; or, to speak more properly, that fire has been employed, not in the construction, but towards the demolition of such buildings: and for the latter purpose it would certainly prove much more efficacious than for the former. It is much to be doubted, whether it would be at all possible, even in the present

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sent day, by the utmost combination of labour and of skill, to surround a large space of ground with a double rampart of stones compacted by fire, of such height and solidity as to answer any purpose of security or defence against an enemy. Any structure of this kind must have been irregular, low, fragile, easily scaled, and quite insecure; a much weaker rampart, in short, than a simple wall of turf or wooden palisade. The vestiges yet remaining, as I have already observed, give no room to suppose that the vitrified mound has ever been much more entire than it is at present. The effect of fire upon structures reared in the manner I have supposed them to have been, will account most perfectly for their present appearance. It was from necessity that the builders of these fortifications betook themselves to a mode of structure so liable to be destroyed by fire. In those parts where stones could be easily quarried, of such size and form as to rear a rampart by themselves of sufficient strength and solidity, there was no occasion to employ wood or turf in its construction; and it was therefore proof against all assaults by fire. Such are the ramparts which appear on the hill of Dun-Jardel, Dun-Evan, and many others, on which there is not the smallest appearance of vitrification. But on Craig Phadrick, and the other hills above described, where, from the nature of the rock, the stones could be procured only in irregular and generally small fragments, it was necessary to employ some such mode of construction as I have supposed; and these ramparts, though solid and well calculated for defence against every attack by force or stratagem, were not proof against an assault by fire."

Mr Cordiner is of opinion, that the vitrifications in question cannot have been the works of art, and ridicules the contrary hypothesis; though without adducing any argument against it. The Hill of Noth is by him supposed to have been a volcano. He describes it as "a most majestic mountain, in general brown, with moss and heath, interspersed with bare rock, in many places crumbling down. The highest part of it is a circular hill, whose verdure, as well as height, distinguishes it from the rest of the mountain. This is called the *Top of Noth*; and bears the strongest resemblance to every description of a volcanic mount. At the distance of many miles, one can distinguish those ridges which are the boundaries of the crater, indicating the hollow in the top." The gentleman from whom Mr Cordiner received the account of the vitrifications on the summit, informs us, that on first seeing specimens of them, he imagined that they had been pieces of stone calcined by the burning down of a castle; as he had found something very like them on the castle-hill at Cullen, in parts where the sward of grass was broken: but on reaching the top, and viewing the appearances on it already described, he altered his opinion. "That men hardly beset (says he) might climb up with some provisions to this as a place of refuge, is probable: but that, on a barren mountain-top, far from cultivated ground, half a day's journey from the plain; that there, in any period of society, man should have been tempted to build that amazing rampart, is not to be imagined: they have found it a natural and extensive fortress, and in critical circumstances have made use of it accordingly. That it has been occupied as a place of strength and of refuge, is

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very evident; for, some hundred yards down lower on the hill, there are the remains of another rampart or wall, consisting of loose stones piled together without any cement, carried quite round the hill. This last has been built for an additional defence to those who made their abode on the top. The top of Noth, for two-thirds downwards, is covered with a green sward; below that, it is brown with heath: this is the very reverse of the adjacent mountains; and the greater verdure of the upper part I imputed to a new soil created by the ashes of the volcano. The opening, called a *well*, I suppose to have been the latest crater. About a mile south, down towards the lower grounds of the *Cabrock*, there is a very pretty regular green hill, which I ascribe to a later eruption than those which may have formed the contiguous hills now covered with heath. There is an extraordinary luxuriant spring of water rushes out at once from the side of the hill of Noth; which is likewise some confirmation of the opinion that a volcano has some time existed there, which has occasioned great hollows and reservoirs of water in the heart of the mountain. And the wild irregularities of nature through all the *Cabrock*, the hideous and strange projection of rocks from the sides of the hills, would seem to indicate some vast convulsions which the earth must have suffered in these parts.

"The traces of ancient volcanoes (says Mr Cordiner) are far from being unfrequent in Scotland. The hill of Finhaven is one instance; and not only abundant in this species of lava, but with *tarras*, or the *pulvis puteolanus*, an *amalgama*, as Condamine calls it, of calcined stones mixed with scorias and iron-rust reduced to powder. The hill of Beregonium, near Dunstaffage castle, is another, yielding vast quantities of pumices or scoria of different kinds; many of which are of the same species with those of the volcanic Iceland. The noble assemblage of basaltic columns at Staffa, those in the Isle of Sky, and the rock Humble, are but so many evidences of the ancient volcanoes of this country. And finally, the immense stratum of pumex vitreus or Iceland agate, on the hill of Dun-foin in Arran, is the last proof I shall bring in support of the question."

On this dispute we can only observe, that whatever side we embrace, the difficulties seem to be very great, nay almost insurmountable. When we consider the great thickness of the walls on the top of Noth, from 8 to 12 feet, and the vast mound of vitrified matter, no less than 40 feet in breadth, mentioned by Mr Tytler, we can scarce conceive it possible that less than a volcanic fire could be able to form them. We may easily allow, that, in the way this gentleman mentions, there might be considerable vitrifications formed; but that such immense masses should be brought into perfect fusion by the small quantity of fuel which could be put round them in palisades, or intermixed with the materials themselves, will be incredible to every one acquainted with the extreme difficulty with which stones of any magnitude are brought into complete fusion. We see even in the insides of furnaces, though sometimes built of no more unfusible materials than common brick, no such effects follow. There is a slight vitrification indeed, but it scarce ever penetrates to the depth of an inch or two, though very violent fires are kept

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kept up for a much longer time than we could suppose the wood surrounding those walls to require for its being consumed. In conflagrations, where houses are consumed, which are the only similar examples we have, no such effect is perceived. Even in the great fire at London in 1666, where so many buildings were destroyed, we do not hear of their walls being vitrified, though the materials of many of them were undoubtedly as fusible as the rocks and stones of Craig-Phadrick, or the Top of Noth. If, on the other hand, we reject this, and adhere to the volcanic hypothesis, our difficulties are equally great. For where shall we find in any other part of the world an example of volcanoes ejecting lava in the form of walls inclosing a regular area? This would be attributing such a singularity to the volcanoes of Scotland as the most extravagant imagination cannot admit. We must therefore conclude, that though these ruins are certainly the works of art, we have not yet sufficient data to decide the question with respect to their construction; but that the subject requires a farther investigation.

In the paper already quoted, Mr Tytler observes, that "these ancient fortifications present a more curious and interesting object of speculation, than those uncertain and indeed fruitless conjectures as to the mode in which they have been reared." This, he justly observes, must have been before the use of mortar was known; for as the country abounded in limestone, and the builders certainly would exert all their powers in giving them a proper degree of strength, it would undoubtedly have been used. Hence we are led to ascribe to these a very considerable degree of antiquity; for as the Britons were taught the use of mortar by the Romans, it is probable that we must date the origin of the structures in question before the time of the invasion of that people, or at least soon after it: so that we must look upon them to be more than 1650 years old; but how far beyond that period we are to search for their origin, does not appear. "All that we can conclude with certainty (says our author) is, that they belong to a period of extreme barbarism. They must have been constructed by a people scarcely removed from the state of savages, who lived under no impression of fixed or regulated property in land; whose only appropriated goods were their cattle; and whose sole security, in a life of constant depredation, was the retreat to the summits of those hills of difficult access, which they had fortified in the best manner they could. As the space inclosed was incapable of containing a great number of men, especially if occupied in part by cattle, it is presumable, that these retreats were formed chiefly for the security of the women and children of the canton and of their herds. They could be defended by a few men, while the rest of the tribe were engaged with their enemies in the field."

Our author concludes his dissertation with a conjecture, which indeed seems well supported, that the forts in question were constructed, not only before the Roman invasion, but before the introduction of the rites of the Druids into Britain; as "there appears no probability that the inhabitants either lived under such a government as we know to have prevailed under the influence of the Druids, or had any acquaintance with those arts which it is certain they cultivated."

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FORTALICE, in Scots law, signified anciently a small place of strength, originally built for the defence of the country; and which on that account was formerly reckoned *inter Regalia*, and did not go along with the lands upon which it was situated without a special grant from the crown. Now, fortalices are carried by a general grant of the lands; and the word is become synonymous with manor-place, messuage, &c.

FORTESCUE (Sir John), lord chief justice of the king's bench, and lord high chancellor of England, in the reign of king Henry VI. was descended from the ancient family of Fortescue, in the county of Devon. He studied the municipal laws of England in Lincoln's Inn, of which he was made one of the governors in the fourth and seventh years of the reign of king Henry VI. In 1430 he was called to the degree of a serjeant at law, and in 1441 was constituted the king's serjeant. The following year he was made lord chief justice of the king's bench; in which honourable station he continued till near the end of that king's reign, who showed him many particular marks of his favour, and advanced him to the post of lord high chancellor of England. During the reign of king Edward IV. he followed the fortunes of the house of Lancaster, and was many years in exile with queen Margaret and prince Edward her son. At length, they having a prospect of retrieving their desperate fortunes, the queen and prince returned to England, and Sir John Fortescue, with many others, accompanied them: but soon after the decisive battle of Tewksbury, he was thrown into prison and attainted, with other Lancastrians; but found means to procure his pardon from Edward IV. He wrote, 1. A learned commentary on the politic laws of England, for the use of prince Edward; to one edition of which Mr Selden wrote notes. 2. The difference between an absolute and limited monarchy, as it more particularly regards the English constitution (which was published, with some remarks, by John Fortescue, afterwards lord Fortescue, in 8vo, in 1714; and a second edition was published, with amendments, in 1719): And several works, which still remain in manuscript. He died near 90 years of age; and was buried in the parish church of Ebburton, where a monument was erected to his memory, in 1677, by one of his descendants.

FORTH, one of the most noble and commodious rivers in Scotland. It takes its rise near the bottom of Lomond hills; and running from west to east, receives in its passage many considerable streams, deriving their waters from the eminences in the midland counties of North Britain. Between Stirling and Alloa, the Forth winds in a most beautiful and surprising manner; so that, though it is but four miles by land, it is 24 by water between those two places. Below Alloa the river expands itself to a great breadth between the counties of Lothian and Fife, till at Queen's-ferry it is contracted by promontories shooting into it from both coasts; so that, from being four or five, there it is not above two miles broad. In the middle of the channel lies a small island called *Inchgarvy*, which has a spring of fresh water: upon the island there is an ancient fort, which has been lately repaired; and if there were either forts or blockhouses on the opposite promontories, that part of the river which lies between Alloa and Queens-ferry would be as secure and convenient

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nient a harbour as could be desired. A little below this, near the north shore, lies Inchcomb, on which are the remains of an ancient monastery of considerable extent; and opposite to Leith stands the island of Inchkeith, formerly fortified, but now in ruins. Below Queens-ferry the north and south shores receding, the body of the water gradually enlarges till it becomes two or three leagues broad, affording several safe harbours on both sides, and excellent roads throughout, unembarrassed with latent rocks, shoals, or sands; and allowing secure anchorage to the largest ships within a league of the coast in almost any part of the Frith, and to vessels of a smaller size within a mile or less. The Frith, or (as it is commonly written) the *Frith*, of Forth, is, at the mouth of it, from North Berwick to Fifeness, full five leagues broad; having the little island of May (on which there is a light-house, and there might also be a fort) in the middle of it, and to the west of this the rocky island of Bass; notwithstanding which, the largest fleet may enter and sail up it many miles with the utmost facility and in the greatest safety. In 1781, Admiral Parker's fleet lay some weeks opposite to Edinburgh, accompanied by 500 sail of merchantmen, the whole in full view of the city and castle.

The Forth was known to the ancients by the name of *Bodotria*, or (as Ptolemy calls it) *Boderia*, and has been ever famous for the number of its havens: some of which are, indeed, in their present condition, scarce worthy of that name. It is navigable for merchantmen as high as Alloa, 50 miles from the sea; and for coasters as far as Stirling, 24 miles further by water, though only four by land in a direct line, as already observed. The tide flows only a full mile above Stirling to a place called *Craigforth*, where the proprietor intercepts the passage of the salmon by a cruiue or weir, very injurious to the large tract of country, which stretches as far as Lomond westward. The river from Stirling to the bridge of Aberfoil, at the entrance into the West Highlands, is only passable for man or horse at few places, and these in dry seasons. It glides gently through a dead flat, from Gartmore eastward; "and on these accounts (says Mr Knox*) it might be made navigable for barges, at a trifling expence to the proprietors of the lands, an improvement much wanted in a rich, extensive, and populous valley, without market towns, coal and lime. Supposing this work to be executed, of which there is some probability, the whole

* *View of the British Empire*, vol. ii. p. 518.

extent of navigation on the Forth, will, including all its windings, exceed 200 miles, through a coast of nearly 100 miles; fertile, populous, industrious; and from Stirling eastward, almost lined with towns, anciently the seats of commerce and navigation, till they were ruined by the English depredations; in which miserable state some of them still remain, while others begin to resume the appearance of business. The principal object of these towns was the fisheries, which they prosecuted with great vigour as far as Iceland, till the time of the Union, from which period the eastern fisheries gradually dwindled away; and the poor fishermen, unable to subsist themselves upon air and water, took up the trade of smuggling; but so soon as the fishery laws shall be amended, the salt duties abolished, and an adequate bounty extended to boats as well as busses, these people will readily fall into the track of their ancestors, live by honest industry, and add new vigour to our naval strength. Many of the ports are nearly choked up, others want repairs, which neither the individuals nor the corporations of those decayed places can accomplish. Though the harbours on the Forth are in general small, the depth of water might be made sufficient for vessels of 200 tons burden, which fully answers the purposes of their coasting and Baltic trade; but to obtain this, or even a less depth of water, an aid of 50,000 l. would be requisite."

By this river and the Clyde, Scotland is almost divided into two parts. The Forth falls into the east sea below Edinburgh, and has an easy communication with the whole eastern coast of Great Britain; with France, Ostend, Holland, Hamburg, Prussia, Dantzic, Russia, Sweden, Denmark, Norway, and Greenland. The Clyde falls into the Atlantic ocean below Glasgow, and communicates with the western coast of Great Britain; with Ireland, the south of France, Portugal, Spain, the Mediterranean, America, and the West Indies. These two rivers, thus falling in opposite directions into the two seas which environ our island, and the neck of land between them amounting scarcely to 24 miles, gave rise to the idea of a junction, so as to open a communication across the kingdom, and thereby cut off the long dangerous navigation by the Land's End and the Pentland Frith: an object of vast utility, and which has lately been happily accomplished. See the article CANAL.

Forth.

F O R T I F I C A T I O N ;

THE art of fortifying a town, or other place; or of putting them in such a posture of defence, that every one of its parts defends, and is defended by, some other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end that a small number of men within may be able to defend themselves for a considerable time against the assaults of a numerous army without, so that the enemy in attacking them must of necessity suffer great loss.

The origin and rise of fortification is undoubtedly owing to the degeneracy of mankind. In the first ages of the world, men were dispersed up and down the

countries in separate families, as we are told in the histories of the Jews and Scythians, who wandered from one place to another, for the sake of finding pasture for their cattle. These families became in time so numerous as to form large communities, which settled all together in a place; from whence villages and towns had their origin and rise: but they found it was necessary, for the common security, to surround those towns with walls and ditches, to prevent all violences from their neighbours, and sudden surprises. This was sufficient for some time, till offensive weapons were invented, and conquering became a fashion. Then walls

with

with loop-holes were made at proper distances, in order to screen the defenders against the arrows of the assailants: but finding that, as soon as the enemy got once close to the walls, they could from no part be discovered or repulsed; for this reason they added square towers at proper distances from each other, so that every part of the wall might be defended by the adjacent sides of the towers. However, this manner of inclosing of towns was found to be imperfect, because there remained still one of the faces of the towers which fronted the field that could not be seen from any other part, and therefore could not be defended. To remedy this, they made the towers round instead of square, imagining this figure to be the strongest to resist the battering engines, as likewise to be better defended from the other parts of the wall.

Notwithstanding the superiority of this method above the former, there remained yet a part of these towers unseen and incapable of being defended; which made them change the figure of the towers again; that is, they made them square as before; but, instead of presenting a face to the field as formerly, they presented an angle; by this means they effectually found out such a disposition of their works, that no part could be attacked without being seen or defended by some other part.

This last method was in use a long while; and would in all probability have continued to this day, if gun-powder had not been found out: but the violence of the guns and mortars soon convinced the world, that such towers and walls were but a weak defence against these thundering engines; and besides, as the nature of the attack was entirely changed, it was also necessary to change that of fortifying likewise.

From that time ramparts were added to the walls, the towers enlarged into bastions, and all sorts of out-works have been added, such as ravelins, counter-guards, horn and crown works, and others of the like nature, in order to render the defence in some measure equivalent to the attack.

Notwithstanding all the improvements which have been made in the art of fortifying since the invention of gun-powder, that of attacking is still superior to it: engineers have tried in vain to render the advantages of a fortification equal to those of the attack; the superiority of the besiegers fire, together with the greater number of men, obliges generally, sooner or later, the besieged to submit.

The greatest improvement made in the art of attacking happened in the year 1697, when M. Vauban made first use of ricochet-firing at the siege of Ath, whereby the besieged placed behind the parapets were as much exposed to the fire of the besiegers as if there had been none; whereas, before, they had been secure as long as the parapet was not demolished: and the worst is, that there can be no remedy found to prevent this enfilading, without falling into inconveniencies almost as bad as those which we endeavour to avoid.

FORTIFICATION is either regular or irregular. *Regular* fortification, is that built in a regular polygon, the sides and angles of which are all equal, being commonly about a musket-shot from each other. *Irregular* fortification, on the contrary, is that where the sides and angles are not uniform, equidistant, or equal;

which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

SECT. I. Of Regular Fortification.

ALTHOUGH authors agree as to the general form in the present manner of fortifying, yet they mostly differ in particular constructions of the parts. As it would be both needless and superfluous to treat of all the different methods hitherto proposed, we shall content ourselves with explaining those only which are most esteemed by the best judges, and have been mostly put in practice.

Construction of M. VAUBAN's Method.

This method is divided into little, mean, and great; the *little* is chiefly used in the construction of citadels, the *mean* in that of all sorts of towns, and the *great* in particular cases only.

We shall give the construction of the mean, as being most useful; and refer the reader to the table hereafter, for those dimensions which are different in these several fortifications. Plate CXCVII.

Inscribe in a circle a polygon of as many sides as the fortification is designed to have fronts; let AB be one of the sides of half an hexagon, which bisect by the perpendicular CD; divide half AC of it into nine equal parts, and one of these into ten others; then these divisions will serve as a scale to construct all the parts of the fortification, and each of them is supposed to be a toise or fathom, that is, six French feet; and therefore the whole side AB is supposed to be 180 toises.

As the dividing a line into so many equal parts is troublesome and tedious; it is more convenient to have a scale of equal parts by which the works may be constructed.

If therefore, in this case, the radius is taken equal to 180 toises, and the circle described with that radius being divided into six equal parts, or the radius being carried six times round, you will have an hexagon inscribed; AB being bisected by the perpendicular CD as before, set off 30 toises from C to D, and draw the indefinite lines ADG, BDF; in which take the parts AE, BH, each equal to 50 toises; from the centre E describe an arc through the point H, meeting AD in G, and from the centre H describe an arc through the point E, meeting BD in F; or which is the same, make each of the lines EG, HF, equal to the distance EH; then the lines joining the points A, E, F, G, H, B, will be the principal or outline of the front.

If the same construction be performed on the other sides of the polygon, you will have the principal or outline of the whole fortification.

If, with a radius of 20 toises, there be described circular arcs, from the angular points B, A, M, T, and lines are drawn from the opposite angles E, H, &c. so as to touch these arcs, their parts *ab*, *bc*, &c. together with these arcs, will represent the outline of the ditch.

DEFINITIONS.

1. The part FEALN, is called the bastion.
2. AE, AL, the faces of the bastion.
3. EF, LN, the flanks.
4. FG, the curtain.

5. FN, the gorge of the bastion.
6. AG, BF, the lines of defence.
7. AB, the exterior side of the polygon.
8. CD, the perpendicular.
9. Any line which divides a work into two equal parts, is called the capital of that work.
10. *abc*, the counterscarp of the ditch.
11. A, M, the flanked angles.
12. H, E, L, the angles of the shoulder, or shoulder only.
13. G, F, N, the angles of the flank.
14. Any angle whose point turns from the place is called a *salient angle*, such as A, M: and any angle whose point turns towards the place, *re-entering angle*, such as *b*, F, N.
15. If there be drawn two lines parallel to the principal or outline, the one at 3 toises distance, and the other at 8 from it; then the space *yx* included between the principal one and that farthest distant, is called the *rampart*.

And the space *xx*, contained by the principal line, and that near to it, and which is generally stained black, is called the *parapet*.

16. There is a fine line drawn within four feet of the parapet, which expresses a step called *banquette*.

N. B. All works have a parapet of three toises thick, and a rampart of 8 to 10, besides their slopes. The rampart is elevated more or less above the level of the place, from 10 to 20 feet, according to the nature of the ground and the particular constructions of engineers.

The parapet is a part of the rampart elevated from 6 to $7\frac{1}{2}$ feet above the rest, in order to cover the troops which are drawn up there from the fire of the enemy in a siege; and the banquette is two or three feet higher than the rampart, or about four feet lower than the parapet; so that when the troops stand upon it, they may just be able to fire over the parapet.

17. The body of the place, is all that which is contained within this first rampart: for which reason, it is often said to construct the body of the place; which means properly, the construction of the bastions and curtains.

18. All the works which are constructed beyond the ditch before the body of the place are called *out-works*.

T A B L E.

	Forts.						Little Fortif.				Mean.		Great.	
Side of Polyg.	80	90	100	110	120	130	140	150	160	170	180	190	200	260
Perpendicular.	10	11	12 $\frac{1}{2}$	14	15	16	20	21	23	25	30	31	25	22
Faces bast.	22	25	28	30	33	35	40	42	45	47	50	53	55	60
Cap. of ravel.	25	28	30	35	38	40	45	50	50	52	55	55	60	50

In the first vertical column are the numbers expressing the lengths of the exterior sides from 80 to 260. In the second, the perpendiculars answering to these sides. In the third, the lengths of the faces of bastions; and in the fourth, the lengths of the capitals of the ravelins.

The forts are mostly, if not always, squares: for which reason, the perpendiculars are made one-eighth of the exterior sides; because if they were more, the gorges of the bastions would become too narrow.

The little fortification is chiefly designed for citadels, and are commonly pentagons; the perpendiculars are made one-seventh of the exterior side: the mean is used in all kinds of fortifications from an hexagon upwards to any number of sides: and the great is seldom used but in an irregular fortification, where there are some sides that cannot be made less without much expence; or in a town which lies near a great river, where the side next the river is made from 200 to 260 toises; and as that side is less exposed to be attacked than any other, the perpendicular is made shorter, which saves much expence.

The faces of the bastions are all $\frac{3}{4}$ ths of the exterior sides, or nearly so, because the fractions are neglected.

It may be observed in general, that in all squares the perpendicular is $\frac{1}{4}$ th of the exterior side, and all pentagons $\frac{1}{5}$ th, and in all the rest upward $\frac{1}{6}$ th.

1. Construction of Orillons and retired Flanks.

DESCRIBE the front MPQRST as before, and divide the flank into three equal parts, of which suppose

Sr to be one: from the opposite flanked angle M draw a line Mr, in which take the part *mr* of 5 toises; take likewise Rn in the line of defence MR, produced, equal to 5 toises, and join *nm*, upon which as a base describe the equilateral triangle *npm*, and from the angle *p*, opposite to the base as centre, is described the circular flank *nm*.

And if Sr be bisected by the perpendicular 1, 2, and another be erected upon the face ST, at S; the intersection 2 of these two perpendiculars will be the centre of the arc which forms the orillon.

The orillons are very useful in covering the retired flanks, which cannot be seen but directly in the front; and as these orillons are round, they cannot be so easily destroyed as they would be if they were of any other figure.

2. Construction of Ravelins or Half-moons.

FIG. 2. Set off 55 toises, from the re-entering angle O of the counterscarp, on the capital OL or on the perpendicular produced, and from the point L draw lines to the shoulders AB; whose parts LM, LN, terminated by the counterscarp, will be the faces, and MO, ON, the semi-gorges of the ravelin required.

This is Mr Vauban's method of constructing ravelins, according to some authors: and others will have the faces of the ravelin to terminate on those of the bastions within 3 toises of the shoulders; which seems to be the best way, for these ravelins cover the flanks much better than the others.

The ditch before the ravelin is 12 toises, its counterscarp,

Of
Tenailles.
Plate
CXC VII.

Of
Lunettes,
&c.
Plate
CXC VII.

scarp parallel to the faces of the ravelins ; and is made in a circular arc, before the saliant angle ; as likewise all ditches are in general.

When the ravelins are made with flanks, as in fig. 3. the faces should terminate on those of the bastions, at least 5 toises from the shoulders.

The flanks are made by setting off 10 toises from the extremities of the faces, from *f* to *b*, and from *m* to *l* ; and from the points *b*, *l*, the flanks *b k*, *l p*, are drawn parallel to the capital *LO* of the ravelin.

There are sometimes redoubts made in the ravelin, such as in fig. 2. which is done by setting off 16 toises from the extremities of the faces on the semi gorges from *N* to *b*, and from *M* to *a* ; and from the points *b*, *a*, the faces are drawn parallel to those of the ravelin : the ditch before the redoubt is 6 toises, and its counter-scarp parallel to the faces.

3. Construction of Tenailles.

A tenaille is a work made in the ditch before the curtains, the parapet of which is only 2 or 3 feet higher than the level ground of the ravelin. There are three different forts : the first are those as in fig. 4. which are made in the direction of the lines of defence, leaving a passage of 3 toises between their extremities and the flanks of the bastions, as likewise another of 2 in the middle for a bridge of communication to the ravelin.

The second fort are those as in fig. 5. Their faces are in the lines of defence, and 16 toises long, besides the passage of 3 toises between them and the flanks of the bastions ; their flanks are found by describing arcs from one shoulder of the tenaille as centre through the other, on which are set off 10 toises for the flanks desired.

And the third fort are those as in fig. 6. Their faces are 16 toises, as in the second fort, and the flanks are parallel to those of the bastions.

The use in general of tenailles, is to defend the bottom of the ditch by a grazing fire, as likewise the level ground of the ravelin, and especially the ditch before the redoubt within the ravelin, which can be defended from no where else so well as from them.

The first fort do not defend the ditch so well as the others, as being too oblique a defence ; but as they are not subject to be enfiladed, M. Vauban has generally preferred them in the fortifying of places, as may be seen in the citadel of Lille, at Laudau, New Brisac, and in a great many other places.

The second fort defend the ditch much better than the first, and add a low flank to those of the bastions ; but as these flanks are liable to be enfiladed, they have not been much put in practice. This defect might however be remedied, by making them so as to be covered by the extremities of the parapets of the opposite ravelins, or by some other work.

As to the third fort, they have the same advantage as the second, and are likewise liable to the same objections ; for which reason, they may be used with the same precautions which have been mentioned in the second.

Tenailles are esteemed so necessary, that there is hardly any place fortified without them : and it is not without reason. For when the ditch is dry, the part

behind the tenailles serves as a place of arms, from which the troops may sally, destroy the works of the enemy in the ditch, oppose their descent, and retire with safety ; and the communication from the body of the place to the ravelin becomes easy and secure : which is a great advantage ; for by that means the ravelin may be a much better defence, as it can be supplied with troops and necessaries at any time. And if the ditch is wet, they serve as harbours for boats, which may carry out armed men to oppose the passage over the ditch whenever they please ; and the communication from the tenailles to the ravelin, becomes likewise much easier than it would be without them.

4. Construction of Lunettes.

FIG. 7. Lunettes are placed on both sides of the ravelin, such as *B*, to increase the strength of a place : they are constructed, by bisecting the faces of the ravelin with the perpendicular *LN* ; on which is set off 30 toises from the counter-scarp of the ditch, for one of its faces ; the other face, *PN*, is found by making the semi-gorge *TP* of 25 toises ; the ditch before the lunettes is 12 toises, the parapet 3, and the rampart 8, as in the ravelin.

There is sometimes another work made to cover the saliant angle of the ravelin, such as *A*, called *bonnet*, whose faces are parallel to those of the ravelin, and when produced bisect those of the lunettes ; the ditch before it is 10 toises.

There are likewise lunettes, such as *D* in fig. 8 : whose faces are drawn perpendicular to those of the ravelin, within a third part from the saliant angle ; and their semi-gorges are only 20 toises.

These kind of works may make a good defence, and cost no very great expence ; for as they are so near the ravelin, the communication with it is very easy, and one cannot well be maintained till they are all three taken.

5. Construction of Tenaillons.

FIG. 9. Produce the faces of the ravelin beyond the counter-scarp of the ditch, at a distance *MN* of 30 toises, and take on the counter-scarp of the great ditch 15 toises from the re-entering angle *p* to *q*, and draw *Nq* ; then *qNMp* will be the tenailles required ; its ditch is 12 toises, that is, the same as that of the ravelin. Sometimes there is made a retired battery in the front of the tenaillons, as in *B* ; this battery is 10 toises from the front to which it is parallel, and 15 toises long.

There are commonly retrenchments made in the tenaillons, such as *O* ; their parapets are parallel to the fronts *MN*, and bisect the side *qN* ; the ditch before this retrenchment is 3 toises : and there is a banquette before the parapet next to the ditch of about 8 feet, called *berm* ; which serves to prevent the earth of the parapet (which seldom has any revetment) from falling into the ditch.

It is to be observed, that the ravelin, before which tenaillons are constructed, must have its saliant angle much greater than the former construction makes them ; otherwise the saliant angles of the tenaillons become too acute ; for which reason we made the capital of this

Of
Counter-
guards, &c.

Plate
CXC VII.

this ravelin 45 toises, and the faces terminate within 3 toises of the shoulders.

6. Construction of Counterguards.

FIG. 10, 11. When the counterguard is placed before the ravelin, set off 40 toises on the capital of the ravelin from the salient angle A to the salient angle B, of the counterguard; and 10 from C to D, on the counterescarp of the ditch.

When the counterguard is before the bastion, such as in fig. 2. its salient angle F is 50 toises from the salient angle E of the bastion, and the breadth near the ditch of the ravelin 10 toises as before.

The ditch before the counterguards is 12 toises, and its counterescarp parallel to the faces.

Counterguards are made before the ravelin on some particular occasions only; but are frequently constructed before the bastions, as covering the flanks wonderfully well. Some authors, as Mr Blondel and Mr Coehorn, will have them much narrower than they are here.

7. Construction of Hornworks.

FIG. 12. Produce the capital of the ravelin beyond the salient angle A, at a distance AB of about 80 toises; draw DBE at right angles to AB; in which take BD, BE, each equal to 55 toises; and on the exterior side DE, trace a front of a polygon in the same manner as that of the body of the place, making the perpendicular BF 10 toises, and the faces 30.

The branches D a, E b, of the hornwork, when produced, terminate on the faces of the bastions, within 5 toises of the shoulders. The ditch of the hornwork is 12 toises, and its counterescarp parallel to the branches; and in the front terminates at the shoulders, in the same manner as the great ditch before the bastions.

The capital of the ravelin before the front of the hornwork is 35 toises, and the faces terminate on the shoulders, or rather 2 or 3 toises beyond them; and the ditch before the ravelin is 8 toises.

There are sometimes retrenchments made within the hornwork, such as S, S; which are constructed by erecting perpendiculars to the faces of the ravelins, within 25 toises of their extremities. This retrenchment, like all others, has a parapet turfed only with a berm of 8 feet before it; as likewise a ditch from 3 to 5 toises broad.

FIG. 13. When a hornwork is made before the bastion, the distance DL of the front from the salient angle of the bastion is 100 toises, and the branches terminate on the faces of the adjacent ravelins within 5 toises from their extremities; all the rest is the same as before.

8. Construction of Crown-works.

Plate
CXC VIII.

FROM the salient angle, A (fig. 1.) of the ravelin, as a centre, describe an arc of a circle with a radius of about 120 toises, cutting the capital of the ravelin produced at C; from the point C, set off the cords CB, CF, each of them equal to 110 toises; and on each of which, as an exterior side, construct a front of a polygon of the same dimensions as in the hornwork; that is, the perpendicular should be 18 toises, the faces

30, and the branches terminate on the faces of the bastions within 25 toises of the shoulders.

The ditch is 12 toises, the capital of the ravelin 35, and its ditch 8; that is, the same as in the hornwork.

Sometimes the crownwork is made before the bastion, as in fig. 2. The arc is described from the salient angle A of the bastion, with a radius of 120 toises, as before; and the branches terminate on the faces of the adjacent ravelins within 25 toises of their extremities: the rest of the dimensions and constructions are the same as before.

Hornworks, as well as crownworks, are never made but when a large spot of ground falls beyond the fortification, which might be advantageous to an enemy in a siege, or to cover some gate or entrance into a town.

9. Construction of Covert-ways and Glacis.

ALTHOUGH we have not hitherto mentioned the covert-way, nevertheless all fortifications whatsoever have one; for they are esteemed to be one of the most essential parts of a modern fortification; and it is certain, the taking the covert-way, when it is in a good condition and well defended, is generally the most bloody action of the siege.

After having constructed the body of the place, and all the outworks which are thought necessary, lines are drawn parallel to the outmost counterescarp of the ditches, at 6 toises distant from it; and the space *mn*, *m n*, included between that line and the counterescarp, will be the covert-way required.

FIG. 3. There is in every re-entering angle of the counterescarp a place of arms, *m*; which is found by setting off 20 toises from the re-entering angle *a*, on both sides from *a* to *b*, and from *a* to *c*; and from the points *b*, *c*, as centres, arcs are described with a radius of 25 toises, so as to intersect each other in *d*; then the lines drawn from this intersection to the points *b*, *c*, will be the faces of the places of arms.

If lines are drawn, parallel to the lines which terminate the covert way, and the places of arms, at 20 toises distant from them, the space *x*, *x*, *x*, between these lines and those which terminate the covert-way, will be the glacis.

At the extremities of the places of arms, are traverses made, such as *v*, *v*, which serve to inclose them; these traverses are 3 toises thick, and as long as the covert-way is broad; and a passage is cut in the glacis round them, of about 6 or 8 feet, in order to have a free communication with the rest of the covert-way.

There are also traverses of the same dimensions before every salient angle of the bastion and outworks, and are in the same direction as the faces of those works produced; and the thickness lies at the same side as the parapets.

The passages round these last traverses are likewise from 6 to 8 feet wide.

In each place of arms are two sally ports *z z*, which are 10 or 12 feet wide, for the troops to sally out; in time of a siege they are shut up, with barriers or gates.

10. Construction of Arrows and Detached Redoubts.

AN arrow is a work made before the salient angles of the glacis, such as A, fig. 3. It is composed of a
6
parapet

Of
Covert-
ways, &c.

Plate
CXC VIII.

parapet of 3 toises thick, and 40 long; and the ditch before it 5 toises, terminating in a slope at both ends. The communication from the covert way into these arrows is 4 or 5 toises wide; and there is a traverse, *r*, at the entrance, of 3 toises thick, with a passage of 6 or 8 feet round it.

A detached redoubt is a kind of work much like a ravelin, with flanks placed beyond the glacis; such as *B*: they are made in order to occupy some spot of ground which might be advantageous to the besiegers; likewise to oblige the enemy to open their trenches farther off than they would do otherwise.

Their distance from the covert-way ought not to exceed 120 toises, that it may be defended by musket-shot from thence.

The gorge *ab* is 40 toises; the flanks *ac*, *bf*, which are perpendicular to the gorge, 10; and the faces *cd*, *fd*, 30: the ditch before it is 6 toises, ending in slopes at both ends; the covert-way 4; the branches of the covert-way are 42 toises long, or thereabouts; the faces of the places of arms *y*, *y*, which are perpendicular to the branches, 10; and the other, which is parallel to them, 14.

The communication from the covert-way into the redoubt, is 5 or 6 toises wide; and there is a traverse made just at the entrance, and another in the middle when it is pretty long. The parapets of this communication terminate in a slope or glacis.

If these redoubts are above 50 toises distant from the covert-way, the besiegers carry their trenches round, and enter through the gorge; by which the troops that are in them are made prisoners of war, if they do not retire betimes; to prevent which, some other outworks should be made to support them.

11. Construction of Second Ditches and Covert-ways.

Fig. 4. When the ground is low, and water to be found, there is often a ditch about 10 or 12 toises made round the glacis; and opposite to the places of arms are constructed lunettes, beyond the ditch: such as *D*, whose breadth on the counterscarp of the ditch is 10 toises, from *b* to *a*, and from *c* to *d*; and the faces *aL*, *dL*, are parallel to those of the places of arms; the ditch before them is from 8 to 10 toises wide.

The second covert-way is 4 toises, the semi-gorges of the places of arms, *m*, about 15, and the faces perpendicular to the counterscarp; the second glacis is from 15 to 18 toises broad.

This second covert-way has traverses every where, in the same manner as the first.

12. Construction of Profiles.

A PROFILE is the representation of a vertical section of a work; it serves to show those dimensions which cannot be represented in plans, and is necessary in the building of a fortification. Profiles are generally constructed upon a scale of 30 feet to an inch. It would be endless to describe all their particular dimensions; we shall therefore lay down the principal rules only, given by M. Vauban, on this subject.

1. Every work ought to be at least 6 feet higher than that before it, so that it may command those before it; that is, that the garrison may fire from all the works at the same time, with great and small arms, at

the besiegers in their approaches. Notwithstanding this specious pretence, there are several authors who object against it. For, say they, if you can discover the enemy from all the works, they can discover, by the same reason, all the works from their batteries; so that they may destroy them without being obliged to change their situation, and thereby dismount all the guns of the place before they come near it.

But if all the works were of the same height, those within cannot be destroyed, till such time as those before them are taken: guns might be placed in the covert-way and outworks to obstruct the enemy's approach; and when they come near the place, they might be transported into the inner-works: and as the body of the place would be much lower, the expence would be considerably diminished.

But when works are low, they are easily enfiladed by the ricochet batteries, which is a kind of firing with a small quantity of powder, by giving the gun an elevation of 10 or 12 degrees: this might however be partly prevented, by making the parapets near the salient angles, for the space of 8 toises on each side, 5 or 6 feet higher than the rest of the works.

2. The covert-way should be lower than the level-ground, otherwise the body of the place must be raised very high, especially where there are several outworks: this is to be understood only when the works exceed each other in height, otherwise it need not be below the level.

3. The bases of all inward slopes of earth should be at least equal to the height, if not more.

4. The bases of all outward slopes of earth, two-thirds of their heights.

5. The slopes of all walls or revetments should be one-fifth of their height; or one-sixth might perhaps be sufficient: the height of a wall is estimated from the bottom of the ditch, and not from the beginning of its foundation.

6. The slopes of all parapets and traverses are one-sixth of their breadth; that is, 3 feet towards the field; or the inside, where the banquettes should be 3 feet higher than the outside.

7. When the revetment of a rampart goes quite up to the top, 4 feet of the upper part is a vertical wall of 3 feet thick, with a square stone at the top of it projecting 6 inches; and a circular one below, or where the slope begins, of 8 or 10 inches diameter: they go quite round the rampart, and the circular projection is called the *cordon*.

Where the straight part of the wall ends and the slope begins, the wall is always made 5 feet thick; and the counterforts or buttresses reach no higher than that place.

8. When the rampart is partly walled and partly turfed, then one-fifth of the height which is turfed must be added to 5 feet, to get the thickness of the wall above.

And having the thickness of any wall above, by adding one-fifth of its height from the bottom of the ditch, the sum will be the thickness of the wall at the bottom; but if a sixth part is only taken for the slope, then a sixth part must be added.

For instance, suppose a rampart of 30 feet high from the bottom of the ditch, and that 10 of which are to be turfed; then the fifth part of 10, which is 2, added

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to 5, gives 7 for the wall above; and as this wall is 20 feet high, the fifth of which is 4, and 4 added to the thickness 7 above, gives 11 for the thickness near the foundation.

Fig. 1. Represents, in military perspective, the profiles of the body of a place, the ravelin and covert-way; which gives a clear idea of what is meant by a profile, and from which those of all other works may be easily conceived.

SECT. II. *Of Irregular Fortification.*

THE most essential principle in fortification consists in making all the fronts of a place equally strong, so that the enemy may find no advantage in attacking either of the sides. This can happen no otherwise in a regular fortification situated in a plain or even ground: but as there are but few places which are not irregular either in their works or situations, and the nature of the ground may be such as makes it impracticable to build them regular without too great expence; it is so much the more necessary to show in what consists the strength or weakness of a town irregularly fortified, so that the weakest part may be made stronger by additional outworks; as likewise, if such a place is to be attacked, to know which is the strongest or weakest part.

1. *Construction of an irregular place situated in an open country.*

If the place to be fortified is an old town inclosed by a wall or rampart, as it most frequently happens, the engineer is to consider well all the different circumstances of the figure, situation, and nature of the ground; and to regulate his plan accordingly, so as to avoid the disadvantages, and gain all the advantages possible: he should examine, whether by cutting off some parts of the old wall or rampart, and taking in some ground, the place can be reduced into a regular figure, or nearly so; for if that can be done without increasing the expence considerably, it should by no means be omitted. Old towns have often towers placed from distance to distance, as Douay, Tournay, and many other places, which are generally made use of, and mended when it may be done. If there is a rampart without bastions or towers, it must be well considered whether bastions may not be added; or if it is not better to make only some outworks: if the ditch about this rampart is not too wide and deep, it would be advantageous to make detached bastions; otherwise ravelins and counterguards must be constructed. Special care must be taken to make all the sides of the polygon as nearly equal as possible, and that the length of the lines of defence do not exceed the reach of musket-shot; but if that cannot be done, those sides which are on the narrowest part should be made the longest.

If it should happen that some of the sides are inaccessible or of very difficult approach, either on account of some precipice, marshy ground, or inundation, they may be made much longer than the others which are of easy access, and the flanks need not be so large as the rest; by doing so, there will be some expences saved, which may be used in making the other sides stronger by adding more outworks.

There are few situations but what are more advanced.
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tageous in some parts than in others; it is therefore the business of an engineer to distinguish them, and to render those sides strong by art which are not so by nature.

If the situation is low and watery, lunettes or tenail-lons, and such other small outworks, should be constructed; because they are not of any great expence, and may make a very good defence. But if one side of the place only is low, and running water is to be had, a second ditch and covert-way with lunettes may be made, by observing, that if the first glacis is made to slope, so as to become even with the level of the water in the second ditch; or if the water can be swelled by means of dykes or sluices, so as to overflow the best part of the first glacis, it should be done: for by so doing these works will be able to make a very good defence, since the besiegers will find it a difficult matter to lodge themselves upon this glacis; which cannot be done but within a few toises of the first covert-way, where the besieged are ready to receive them, and to destroy their works with great advantage; whereas the enemy cannot support their workmen but from the second covert-way, which is too far off to be of any great service to them.

But if the situation is of a dry nature, without any water about it, caponiers should be made in the great ditch, from the curtains to the ravelin, and batteries raised in the entrance of the ditch before the ravelin, whose parapet must slope off into a glacis so as to afford no cover for the enemy behind them. Arrows and detached redoubts are likewise very proper to be used in such a case; and sometimes horn or crown works, if it should be thought convenient: but these works should never be constructed without an absolute necessity, either to occupy a spot of ground which might be advantageous to the enemy, or to cover some gate or entrance into the town; for they are of great expence, and their defence seems not to be answerable to it.

Most of the places in Flanders are fortified with horn-works, such as Ipres, Tournay, Lille, and others.

If the place to be fortified is new, and the situation will not admit of a regular construction, particular care must be taken in choosing such a spot of ground as is most advantageous, and least liable to any disadvantages either in the building or in the maintaining of it. All hills or rising grounds should be avoided, which might command any part of the works; marshy grounds, because such situations are unwholesome; or lakes and standing waters for the same reason, excepting a lake is or may be made navigable. Good water should be had either within the place or near it, for it is absolutely necessary for men and cattle; the air should be wholesome; otherwise the continual sickness that may reign in such a place might prevent people to come and live in it, and the garrison would not be in a condition to defend themselves as they ought to do. In short, all the different circumstances attending such an undertaking should be maturely considered before a resolution is taken to fortify any place.

When a situation is fixed upon, the next thing to be considered is, the bigness of the town and the number of its outworks; which must absolutely depend upon the consequence such a place is of to a nation. If it is only to guard a pass or entrance into a country, it need not be so large: but if it is to be a place either to promote

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promote or to protect trade, it should be large and commodious; the streets should be wide, and the buildings regular and convenient. As to what regards the fortification, its construction should depend on the nature of the situation, and the number of works, on the funds or expence a prince or a nation will be at; which, however, ought to be according to the benefit arising from such a place: for as such undertakings are of very great expence, an engineer cannot be too sparing in his works; on the contrary, the greatest economy should be used both in regard to the number of works and to their construction. The body of the place may have (A) revetments quite up to the top, or only in part, and the rest turfed; but as to the outworks, they should have half revetments, or they may be made with turf only; as being not so necessary to prevent the place from being surpris'd, which may nevertheless make a good defence.

Fig. 2. is the plan of an octagon, one half of which is similar and equal to the other half; it being supposed, that the situation would not admit of fortification quite regular. The exterior sides are each 180 toises, and the works are constructed according to our method: but because the sides AB, EF, are weaker than the rest, as has been proved before, we have added tenailles, redoubts in the ravelins, and lunettes, to render them nearly equal in strength with the others; and if counter-guards were made before the bastions A and B, it would effectually secure that front. Instead of lunettes, any other works may be made, as may be thought convenient and according to the nature of the ground. If it should be judged necessary to add other outworks to the ravelins all round the place, care must be taken to add likewise more to the fronts AB, EF, in order to render the advantages and disadvantages of attacking on either side equal.

2. *Construction of an irregular place situated on a hill or rock.*

IN the construction of such places, care must be taken that no neighbouring hill commands any part of the works. The town should always be built on the highest part; but if it should be thought more convenient to place it lower, then the upper part must be fortified with a fort. The situation should be made level as near as possible, by removing the earth from some places to fill up others; and if it cannot well be levelled without extraordinary expence, works must be made on the highest part, so as to command and protect the lower. The works ought to occupy all the upper part of the hill; but if it should be too extensive to be all inclosed, or so irregular as not to be fortified without great inconvenience, the parts which fall without should be fortified with some detached works, and a communication with the place must be made either above or under ground. There should be no cavity or hollow roads within cannon-shot round about the place, where the enemy might be able to approach under cover. If there should happen to be a spring near the top of the hill, it should be inclosed in the fortification; or if that cannot be done, by some work or other: for there is

nothing more necessary, and at the same time scarcer, in such situations, than water; for which reason there cannot be too much care in providing it: several cisterns are to be made to receive the rain-water, and to preserve it; wells should be dug likewise, though ever so deep, the water of which will serve for common use.

Places built on hills or rocks should never be large; for their use is generally to guard passes or inlets into a country, and are seldom useful in traffic; and it is a difficult matter to provide for a large garrison in such situations, neither should any such place be built without some very material reasons: but when it is absolutely necessary, great care and precaution should be taken to render the works as perfect as the situation will admit of, and at the same time to be as frugal in the expence as possible.

3. *Construction of irregular fortifications situated near rivers, lakes, or the sea.*

As the intent of building these kind of places is chiefly to facilitate and protect trade, they are of more importance than any other kind, especially in maritime countries, where the principal strength and power depends on them: for which reason, we shall treat of this construction more largely than of any other.

The first thing to be considered is their situation, which ought to be such as to afford a good harbour for shipping, or a safe and easy entrance in stormy weather; but as it is hardly possible to find any where ships may go in and lie secure with all winds, care should be taken to make them safe to enter with those winds which are most dangerous: but it is not sufficient that the harbour is safe against stormy weather, they should likewise be so against an enemy both by land and water; for it often happens, that ships are destroyed where it was imagined they were secure, which is of too great consequence not to be provided against; for which reason, forts or batteries must be built in the most convenient places, to prevent the enemy's ships from coming too near, so as to be able to cannonade those in the harbour, or sling shells amongst them; and if there is any danger of an enemy's approach by land, high ramparts and edifices must be built, so as to cover them.

When a river is pretty large, and it is not convenient for making a harbour without great expence, the ships may ride along the shore; which, for that reason, must be made accessible for ships of burden: this may be done by advancing the quay into the river if the water is too shallow, or by digging the river sufficiently deep for that purpose.

And to prevent an enemy from coming up the river, forts must be built on both sides, especially when there are any turnings or windings. Antwerp is such a place: for the Scheld is sufficiently deep to carry ships of great burden, which may come quite near the town-wall; and several forts are built below it on both sides, so that it would not be an easy matter for an enemy to come up the river.

When the river is but small, so that no ships of burden

(A) Revetments are chiefly made to prevent a place from being surpris'd: outworks do not want to be made so; the taking them by surprise is of no great consequence, except in a siege, when other cautions are used to prevent it.

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den can come through it, it is sufficient to make it run through some of the works, where proper landing-places are contrived, from whence the goods may be carried in to the place; as at Sarrelouis, where a hornwork is built beyond the Sarre, in the gorge of which the goods are landed.

If the breadth of the river does not exceed 200 yards, it commonly passes through the middle of the town, and proper quays are made on each side; in such a case, the fortification is so contrived, as that the river passes through the curtain, in order to have a bastion on each side to defend the coming in and going out.

When M. Vauban fortified near rivers, he made always the exterior side near the water much longer than any of the others; such as Hunninghen on the Rhine, and Sarrelouis on the Sarre; but for what reason he fortified these places in that manner, has not been told by any author.

But it is plain that the sides which terminate at the river are the weakest; because the besiegers trenches being secured by the river, they may draw most of their troops off, and act therefore with more vigour and strength on the other side: besides, as the strength of a side increases in proportion as the angle of the polygon is greater, by making the side next the river longer, the angles at its extremities become wider, and consequently the adjacent sides stronger.

There are other advantages, besides those mentioned already, which arise from the lengthening that side: for if the river is pretty deep so as not to be fordable, that side is not liable to be attacked; and by increasing its length, the capacity of the place increases much more in proportion to the expence, than if more sides were made; the centre of the place will be likewise nearer the river, which makes it more convenient for transporting the goods from the water-side to any part of the town.

Fig. 3.

To illustrate this method of M. Vauban's, we shall give the plan of Hunninghen: this place was built for the sake of having a bridge over the Rhine, for which reason he made it only a pentagon; the side AB next to the river is 200 toises, and each of the others but 180.

About the space *abc*, which lies before the front AB, is a stone wall; and the passages *xx* are shut up with sluices, to retain the water in the ditches in dry seasons: and to prevent an enemy from destroying the sluice near the point *c*, whereby the water would run out and leave the ditches dry, the redoubt *y* was built in the little island hard by, in order to cover that sluice; without which precaution the place might be insulted from the river side, where the water is shallow in dry seasons.

The hornwork K beyond the Rhine was built to cover the bridge; but as this work cannot be well defended 'cross the river, the hornwork H was made to support the other.

Before finishing the description of this plan, we shall show how to find the long side AB.

After having inscribed the two sides GE, GF, in a circle, draw the diameter CD, so as to be equally distant from the line joining the points E F that is parallel to it. On this diameter set off 100 toises on each side of the centre; from these points draw two indefinite perpendiculars to the diameter; then if from the points E F, as centres, two arcs are described with a radius of 180 toises, their intersections A and B, with the said perpendiculars, will determine the long side AB, as likewise the other two FB and EA. In like manner may be found the long or short side of any polygon whatsoever.

When a place near a river is to be fortified for the safety of commerce, particular care should be taken in leaving a good space between the houses and the water-side, to have a key or landing place for goods brought by water; it should also be contrived to have proper places for ships and boats to lie secure in stormy weather, and in time of a siege; and as water-carriage is very advantageous for transporting goods from one place to another, as likewise for bringing the necessary materials, not only for building the fortifications, but also the place itself, the expences will be lessened considerably when this convenience can be had; for which reason, places should never be built any where else but near rivers, lakes, or the sea; excepting in extraordinary cases, where it cannot be avoided.

F O R

Fortin
Fortitude.

FORTIN, FORTELET, or *Field-fort*, a sconce or little fort, whose flanked angles are generally 120 fathoms distant from one another.

The extent and figure of fortins are different, according to the situation and nature of the ground; some of them having whole bastions, and others demi-bastions. They are made use of only for a time, either to defend the lines of circumvallation, or to guard some passage or dangerous post.

FORTISSIMO, in music, sometimes denoted by FFF, or *fff*, signifies, to sing or play very loud or strong.

FORTITUDE, a virtue or quality of the mind, generally considered as the same with COURAGE; tho' in a more accurate sense they seem to be distinguishable. Courage may be a virtue or a vice, according to circumstances; *fortitude* is always a virtue: we speak

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of desperate courage, but not of desperate fortitude. A contempt or neglect of danger, without regard to consequences, may be called *courage*; and this some brutes have as well as we; in them it is the effect of natural instinct chiefly; in man it depends partly on habit, partly on strength of nerves, and partly on want of consideration. But fortitude is the virtue of a rational and considerate mind, and is founded in a sense of honour and a regard to duty. There may be courage in fighting a duel, though that folly is more frequently the effect of cowardice: there may be courage in an act of piracy or robbery; but there can be no fortitude in perpetrating a crime. Fortitude implies a love of equity and of public good; for, as Plato and Cicero observe, courage exerted for a selfish purpose, or without a regard to justice, ought to be called audacity rather than fortitude.

Fortitude,
Fortuna.Fortunate,
Fortune.

This virtue takes different names, according as it acts in opposition to different sorts of evil; but some of those names are applied with considerable latitude. With respect to danger in general, fortitude may be termed *intrepidity*; with respect to the dangers of war, *valour*; with respect to pain of body or distress of mind, *patience*; with respect to labour, *activity*; with respect to injury, *forbearance*; with respect to our condition in general, *magnanimity*.

Fortitude is very becoming in both sexes; but courage is not so suitable to the female character: for in women, on ordinary occasions of danger, a certain degree of timidity is not unseemly, because it betokens gentleness of disposition. Yet from those of very high rank, from a queen or an empress, courage in emergencies of great public danger would be expected, and the want of it blamed; we should overlook the sex, and consider the duties of the station. In general, however, masculine boldness in a woman is disagreeable; the term *virago* conveys an offensive idea. The female warriors of antiquity, whether real or fabulous, Camilla, Thalestris, and the whole community of AMAZONS, were unamiable personages. But female courage exerted in defence of a child, a husband, or a near relation, would be true fortitude, and deserve the highest encomiums.

The motives to fortitude are many and powerful. This virtue tends greatly to the happiness of the individual, by giving composure and presence of mind, and keeping the other passions in due subordination. To public good it is essential; for without it, the independence and liberty of nations would be impossible. It gives to a character that elevation which poets, orators, and historians, have in all ages vied with one another to celebrate. Nothing so effectually inspires it as rational piety; the fear of God is the best security against every other fear. A true estimate of human life; its shortness and uncertainty; the numberless evils and temptations to which by a long continuance in this world we must unavoidably be exposed; ought by no means to discourage or to throw any gloom on our future prospects: they should teach us, that many things are more formidable than death; and that nothing is lost, but much gained, when, by the appointment of Providence, a well-spent life is brought to a conclusion.

Let it be considered too, that pusillanimity and fearfulness can never avail us any thing. On the contrary, they debase our nature, poison all our comforts, and make us despicable in the eyes of others; they darken our reason, disconcert our schemes, enfeeble our efforts, extinguish our hopes, and add tenfold poignancy to all the evils of life. In battle, the brave soldier is in less danger than the coward; in less danger even of death and wounds, because better prepared to defend himself; in far less danger of infelicity; and has before him the animating hope of victory and honour. So in life, the man of true fortitude is in less danger of disappointment than others are, because his understanding is clear, and his mind disencumbered; he is prepared to meet calamity without the fear of sinking under it; and he has before him the near prospect of another life, in which they who piously bear the evils of this will obtain a glorious reward.

FORTUNA, a goddess worshipped with great de-

votion by the ancient Greeks and Romans; who believed her to preside over human affairs, and to distribute wealth and honour at her pleasure. See FORTUNE.

FORTUNATE-ISLANDS, in ancient geography, certain islands (concerning the situation of which authors are not agreed) famous for the golden apples of the HESPERIDES.—The common opinion is, that they are the CANARY Islands.

FORTUNE (ΤΥΧΗ), a name which among the ancients seems to have denoted a principle of fortuity, whereby things came to pass, without being necessitated thereto: but what and whence that principle is, they do not seem to have ever precisely thought. Hence their philosophers are often intimating, that men only framed the phantom *Fortune* to hide their ignorance; and that they call *Fortune* whatever befalls a man without his knowing for what purpose. Hence Juvenal (sat. x. ver. 366.) affirms, they were men who made a deity of Fortune.

*Nullum numen abest, si sit prudentia; sed te
Nos facimus, Fortuna, deam, cæloque locamus.*

The ingenious Mr Spence gives another reading of this passage:

*Nullum numen habes, si sit prudentia; sed te
Nos facimus, Fortuna, deam cæloque locamus.*

This reading, he thinks, agrees best with the context: Juvenal says, ver. 356. that the two things we should pray for are good health and good sense; that we might be the authors of our own happiness if we pleased, ver 363; that virtue is the only way to true happiness, ver. 364; that if we ourselves are prudent, Fortune has no power over us; and that, in truth, she is no goddess at all, and has only usurped a seat in heaven from the folly of mankind, ver. 366. Fortune was not considered as a deity by the old Romans, but was made so by the devotion and folly of the vulgar; and Mr Spence says, that he has seen an ancient gem, in which Cybele, the mother of the gods, is represented as turning away her head from Fortune, in an attitude of disowning and rejecting her; (Polymetis, p. 150, 154. &c.)

According to the opinion of the heathens, therefore, fortune in reality was only the arrival of things in a sudden and unexpected manner, without any apparent cause or reason: so that the philosophical sense of the word coincides with what is vulgarly called *chance*.

But in religion it had a farther force; altars and temples in great numbers were consecrated to this Fortune, as a deity. This intimates, that the heathens had personified, and even deified, their chance; and conceived her as a sort of goddess, who disposed of the fate of men at her pleasure. Hence that invocation of Horace, *O diva, gratum quæ regis Antium*, in the 35th ode of the first book, where he recommends Augustus, then preparing for a visit to Britain, to her protection. From these different sentiments it may be inferred, that the ancients at one time took Fortune for a peremptory cause, bent upon doing good to some, and persecuting others; and sometimes for a blind inconstant cause, without any view or determination at all.

If then the word *fortune* had no certain idea in the mouth of those who erected altars to her, much less can it be ascertained what it denotes in the mind of

Fortune
||
Forum.

those who now use the word in their writings. They who would substitute the name *Providence* in lieu of that of *Fortune*, cannot give any tolerable sense to half the phrases wherein the word occurs.

Horace paints the goddess, preceded by Necessity, holding nails and wedges in her hands, with a cramp-iron, and melted lead to fasten it; rarely accompanied with Fidelity, unless when she abandons a family; for in that case Fidelity never fails to depart with her, as well as friends.

She is disrespectfully spoken of by most of the Roman writers, and represented as blind, inconstant, unjust, and delighting in mischief, (*Ovid. ad Liv. ver. 52. ver. 374. Hor. lib. i. od. 34. ver. 26. lib. iii. od. 29. ver. 51. Statius, Theb. xii. ver. 505.*) However, they had a good as well as a bad Fortune, a constant and inconstant Fortune; the latter of which was represented with wings, and a wheel by her, (*Hor. lib. iii. od. 29. ver. 56.*) Juvenal alludes to a statue of Fortune, which exhibited her under a very good character, as the patroness of the poor infants that were exposed by their parents in the streets, (*Sat. vi. ver. 605.*)

The painters represent her in a woman's habit, with a bandage before her eyes, to show that she acts without discernment; and standing on a wheel, to express her instability. The Romans, says Lactantius, represented her with a cornucopia, and the helm of a ship, to show that she distributes riches, and directs the affairs of the world. In effect, it is with such characters that we see her represented on so many medals, with the inscriptions, *FORTVNA AVG. FORTVNA REDVX. FORTVNAE AVG. OR REDVCIS, &c.* Sometimes she is seen pointing at a globe before her feet, with a sceptre in one hand, and holding the cornucopia in the other.

The Romans had a virile as well as a muliebrian Fortune, for the objects of their adoration: the *Fortuna virilis* was honoured by the men, and the *Fortuna muliebris* by the women. They honoured Fortune also under a variety of other appellations.

The Romans derived the worship of Fortune from the Greeks, under the reign of Servius Tullius, who dedicated the first temple to her in the public market. Nero also built a temple to Fortune. The Fortune worshipped at Antium was probably of the most exalted character of any among the Romans; if we may judge by the account which Horace gives us of the great solemn processions that were made to her, (*Hor. lib. i. od. 35. ver. 22.*) But the most celebrated temple of Fortune was at Præneste. Statius speaks of several Fortunes there, and calls them the *Prænestine sœurs*, (*Lib. i. Sylv. iii. ver. 80.*)

FORTUNE-Tellers. Persons pretending to tell fortunes are to be punished with a year's imprisonment, and standing four times on the pillory. Stat. 9 Geo. II. c. 5.

FORTY-DAYS Court, the court of attachment or *woodmote*, held before the verderors of the forest once every forty days, to inquire concerning all offenders against vert and venison. See ATTACHMENT.

FORUM, in Roman antiquity, a public standing place within the city of Rome, where causes were judicially tried, and orations delivered to the people.

FORUM was also used for a place of traffic, answering to our market-place. These were generally called

fora venalia; in contradistinction to the former, which were called *fora civilia*.

The *fora civilia* were public courts of justice, very magnificent in themselves, and surrounded with porticos and stately edifices; of these there were six very remarkable: 1. *Forum Romanum*. 2. *Julianum*. 3. *Augustum*. 4. *Palladium*. 5. *Forum Trajani*. 6. *Forum Salvustii*. The *Forum Romanum* was the most noted, and is often called simply *Forum*, by way of eminence. Here was the pleading place called *Rostra*, the *Comitium*, the sanctuary of *Saturn*; temple of *Castor*, &c. See *ROSTRA*, *COMITIUM*, &c.

The *fora venalia*, or market-places, were very numerous. The chief of them were the *forum boarium* for oxen or beef; *suarium* for swine; *pistorium* for bread; *cupedinarium* for dainties; *olitorium* for garden stuff.

The Grecian *Agoræ* exactly correspond with the Roman *fora*, being places where courts and markets were held. At Athens they had many *fora*, but the chief of them were the *old* and the *new*.

FORUM Indicere, was the act of the prætor appointing the place in Rome where causes were to be tried. *Agere forum* denoted the bringing on causes out of Rome, in a Roman province (Cicero, Suetonius); the same with *agere conventum* (Florus).

The term *forum* added to a proper name, denoted some market town or borough; as,

FORUM Alieni, a place mentioned only by Tacitus; and, from what he says of it, thought to be Ferrara, capital of the duchy of that name in Italy. E. Long. 12. 5. N. Lat. 44. 46.

FORUM Appii (Cicero, Luke); a town of the Volsci, in Latium, on the Via Appia, a little beyond the Tres Tabernæ; set down in the Jerusalem Itinerary as situated near the river Nymphæus: now entirely extinct.

FORUM Cornelii, a town of the Cispadana, built by Sylla: Now Imola, a city in the Romania, and territory of the pope. E. Long. 12. 12. N. Lat. 44. 30.

FORUM Domitii, a town of Gallia Narbonensis: probably built by Ahenobarbus Domitius, who commanded in those parts: Now Frontignan, or Frontignac, in Languedoc, near the Mediterranean. E. Long. 3. 30. N. Lat. 43. 30.

FORUM Fulvii, a town of Liguria, surnamed *Valentinum*; from which it is conjectured that it is now Valenza, in the duchy of Milan; which is confirmed by Peutinger's distances. E. Long. 9°. N. Lat. 45°.

FORUM Gallorum, a small town of the Cispadana, on the Via Æmilia, eight miles from Mutina, beyond the river Scultenna. Here Antony defeated Panfa, and was in his turn defeated by Hirtius: Now Castelfranco, in the territory of Bologna.—Another *Forum Gallorum*, a town of the Vascones in the Hither Spain: Now Gurrea, a small town of Arragon.

FORUM Julium. There are several towns of this name; as a *Forum Julium*, of Gallia Narbonensis; or *Forojulium*: Now Frejus, or Frejules, in Provence, at the mouth of the Argens. *Forum Julium Carnorum*, to the north of Aquileia, in the Transpadana: Now *Cividal di Friuli*, formerly *Cividal d'Austria*, in the territory of Venice.

FORUM Jutuntorum, a town of the Insubres, in the Transpadana: Now Cremona, capital of the Cremasco, in

Forum.

Forum
Fosse.

in the territory of Venice. E. Long. 10. 15. N. Lat. 45. 20.

Forum Livii, a town of the Semnones, in the Cispadana; Now *Forli*, in Romania. E. Long. 12. 45. N. Lat. 44. 25.

Forum Segusianorum, situated on the east side of the Liger, in Gallia Celtica; Now *Feurs*, on the Loire, in the Lionnois, capital of the territory of Forez. E. Long. 4. 15. N. Lat. 45. 44.

Forum Tiberii, a town of the Pagus Tigurinus, in Belgica, on the left or south side of the Rhine: Now *Kayserstuhl*; literally the tribunal of Tiberius, which he held there when commander in the Rhetian war.

Forum Vulcani (Strabo); the *Campi Phlegraei* of Pliny: a place in Campania, encompassed with rocky eminences, near Puteoli, and distant from it two miles towards Naples, emitting smoke, and in some places flame, like a large extensive furnace, and yielding sulphur: Now called *Solfatara*, in the Terra di Lavoro.

Forum, is also used, among casuists, &c. for jurisdiction; thus they say, *In foro legis*, &c.

FOSS, or FOSSE, in fortification, &c. a ditch or moat. The word is French, formed of the Latin participle *fossus*, of the verb *fodio* "I dig."

Foss, *Fossa*, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation. When the aperture is very narrow, it is called a *sinus*.

Foss is particularly used for the cavity or denture in the back part of the neck.

FOSSA MAGNA, or NAVICULARIS, is an oblong cavity, forming the inside of the *pubendum muliebre*, and which presents itself upon opening the labia; and in the middle whereof are the *caruncula myrtiformes*. See ANATOMY, p. 470.

Fossa, in our ancient customs, was a ditch full of water, where women committing felony were drowned; as men were hanged: *Nam et ipsi in omnibus tenementis suis omnem ab antiquo legalem habuere iustitiam, videlicet ferrum, fossam, furcas, et similia*. In another sense it is taken for a grave, as appears by these old verses:

*Hic jacet in fossa Reda venerabilis offa;
Hic est fossatus, qui bis erat hic cathedratus.*

Foss-Way was anciently one of the four great Roman high-ways of England: so called, according to Camden, because it was ditched on both sides, which was the Roman method of making highways.

FOSSARII, in antiquity, a kind of officers in the eastern church, whose business was to inter the dead.

Ciaconius relates, that Constantine created 950 fossaries, whom he took out of the divers colleges or companies of tradesmen: he adds, that they were exempted from taxes, services, burdensome offices, &c.

F. Goar, in his notes on the Greek Euchologion, insinuates that the fossarii were established in the times of the apostles; and that the young men, who carried off the body of Ananias, and those persons full of the fear of God, who interred St Stephen, were of the number.

St Jerom assures us, that the rank of fossarii held the first place among the clerks; but he is to be understood of those clerks only who had the direction and intendance of the interment of the devout.

FOSSE, the Roman military-way in South Britain,

begins at Totness, and passes through Exeter, Ivelchester, Shepton-Mallet, Bath, Cirencester, Leicester, the Vale of Belvoir, Newark, Lincoln, to Barton upon the Humber, being still visible in several parts, tho' of 1400 years standing. It had the name from the fosses or ditches made by the sides of it.

FOSSIL, in natural history, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, stones, salts, earths, and other minerals; or extraneous, repositied in the bowels of the earth by some extraordinary means, as earthquakes, the deluge, &c. See METAL, STONE, &c.

Native fossils, according to Dr Hill, are substances found either buried in the earth, or lying on its surface, of a plain simple structure, and showing no signs of containing vessels or circulating juices. These are subdivided by the same author, 1. Into fossils naturally and essentially simple. Of these, some are neither inflammable nor soluble in water; as simple earths, talcs, fibrariæ, gypsum, selenitæ, crystal, and spars: others, though uninflamable, are soluble in water; as all the simple salts; and others, on the contrary, are inflamable, but not soluble in water; as sulphur, auripigmentum, zarnich, amber, ambergrease, gagates, asphaltum, ampelites, lithanthrax, naphtha, and pissaphalta. 2. The second general subdivision of fossils comprehends all such as are naturally compound, but unmetallic. Of these, some are neither inflamable, nor soluble in water; as compound earths, stones, septariæ, siderochita, semipellucid gems, &c. others are soluble in water, but not inflamable; as all the metallic salts: and, lastly, some are inflamable, but not soluble in water; as the marcasites, pyritæ, and phlogonia. 3. The third, and last, general division of fossils comprehends all the metallic ones; which are bodies naturally hard, remarkably heavy, and fusible in fire. Of these, some are perfectly metallic, as being malleable when pure; such are gold, lead, silver, copper, iron, and tin: others are imperfectly metallic, as not being malleable even in their purest state; such are antimony, bismuth, cobalt, zinc, and quicksilver or mercury. Of all which substances, the reader will find a particular description under their respective heads.

Extraneous fossils are bodies of the vegetable or animal kingdoms accidentally buried in the earth. Of the vegetable kingdom, there are principally three kinds, trees or parts of them, herbaceous plants, and corals; and of the animal kingdom there are four kinds, sea-shells, the teeth or bony palates and bones of fishes, complete-fishes, and the bones of land-animals. See BONES, TREE, WOOD, PLANT, SHELL, &c.

These adventitious or extraneous fossils, thus found buried in great abundance in divers parts of the earth, have employed the curiosity of several of our latest naturalists, who have each their several system to account for the surprising appearances of petrefied sea-fishes, in places far remote from the sea, and on the tops of mountains; shells in the middle of quarries of stone; and of elephants teeth, and bones of divers animals, peculiar to the southern climates, and plants only growing in the east, found fossile in our northern and western parts.

Some will have these shells, &c. to be real stones, and

Fossil.

Plates
CC. & CCL

Fossil,
Foster.

and stone plants, formed after the usual manner of other figured stones; of which opinion is the learned Dr Lister.

Another opinion is, that these fossil shells, with all their foreign bodies found within the earth, as bones, trees, plants, &c. were buried therein at the time of the universal deluge; and that, having been penetrated either by the bituminous matter abounding chiefly in watery places, or by the salts of the earth, they have been preserved entire, and sometimes petrified.

Others think, that those shells, found at the tops of the highest mountains, could never have been carried thither by the waters, even of the deluge; inasmuch as most of these aquatic animals, on account of the weight of their shells, always remain at the bottom of the water, and never move but close along the ground. They imagine, that a year's continuance of the waters of the deluge, intermixed with the salt waters of the sea, upon the surface of the earth, might well give occasion to the production of shells of diverse kinds in different climates; and that the universal saltness of the water was the real cause of their resemblance to the sea-shells, as the lakes formed daily by the retention of rain or spring water produce different kinds.

Others think, that the waters of the sea, and the rivers, with those which fell from heaven, turned the whole surface of the earth upside down; after the same manner as the waters of the Loire, and other rivers, which roll in a sandy bottom, overturn all their sands, and even the earth itself, in their swellings and inundations; and that in this general subversion, the shells came to be interred here, fishes there, trees there, &c. See DELUGE.

Dr Woodward, in his Natural History of the Earth, pursuing and improving the hypothesis of Dr Burnet, maintains the whole mass of earth, with every thing belonging thereto, to have been so broken and dissolved at the time of the deluge, that a new earth was then formed on the bosom of the water, consisting of different strata, or beds of terrestrial matter, ranged over each other usually according to the order of their specific gravities. By this means, plants, animals, and especially fishes and shells, not yet dissolved among the rest, remained mixed and blended among the mineral and fossil matters; which preserved them, or at least assumed and retained their figures and impressions either indentedly, or in relieve.

See more on this subject under the article EARTH, *passim*. See also PETRIFACTIONS and STRATA.

Fossile Pitch. See PETROLEUM.

FOSTER (Dr James), a most distinguished and popular dissenting minister, born at Exeter in 1697. He began to preach in 1718; and strong disputes arising soon after, among the dissenters, concerning the Trinity and subscription to tests, his judgment determining him to the obnoxious opinions, the clamour grew loud against him, and occasioned more than one removal. His talents were hid among obscure country congregations, until 1724; when he was chosen to succeed Dr Gale in Barbican, where he laboured as pastor above 20 years. The Sunday evening-lecture, begun in the Old Jury meeting-house in 1728, and which he conducted with such uncommon applause for more than 20 years, indisputably showed his abilities as a preacher. Persons of all persuasions and ranks in life

flocked to hear him: and Mr Pope has honoured him with a commendatory couplet in his satires; which, however, his commentator laboured to destroy the intention of by a frivolous note. In 1746, he attended the unhappy lord Kilmarnock, at his execution on Tower-hill; an office which those who lived with him imagined made too deep an impression on his sympathizing spirit, as his vivacity abated from that time. He died in 1753; after having published several valuable compositions and sermons; particularly, 1. A Defence of Christianity, against Tindal's Christianity as old as the Creation. 2. An Essay on Fundamentals. 3. Four volumes of Sermons. 4. Discourses on Natural Religion and Social Virtue, in 4to.

FOSTER (Samuel), an ingenious English mathematician of the last century, and astronomical professor in Gresham college, was one of that learned association which met for cultivating the new philosophy during the political confusions, and which Charles II. established into the Royal Society. Mr Foster, however, died in 1652, before this incorporation took place; but wrote a number of mathematical and astronomical treatises, too many to particularize. There were two other mathematical students of this name; William Foster, a disciple of Mr Oughtred, who taught in London; and Mark Foster, author of a treatise on trigonometry, who lived later than the former two.

FOTHER, or FODDER, is a weight of lead, containing eight pigs, and every pig one and twenty stone and a half; so that it is about a ton or common cart-load. Among the plumbers in London, it is nineteen hundred and a half; and at the mines it is two and twenty hundred and a half. The word is of Teutonic origin, from *fuder*.

FOTHERGILL (Dr George), was born in Westmoreland in 1705, where his family had been long seated on a competent estate that had descended regularly for several generations. After an academical education in Queen's college, Oxford, of which he became a fellow, he was, in 1751, elected principal of St Edmund's hall, and presented to the vicarage of Brumley in Hampshire. Having been long afflicted with an asthma, he died in 1760. He was the author of a collection of much esteemed sermons, in 2 vols 8vo. The first volume consists of occasional discourses, published by himself; the second printed from his MSS.

FOTHERGILL (Dr John), a late eminent physician, son of John and Margaret, quakers, was born in 1712; at Carr End in Yorkshire, where his father, who had been a brewer at Knaresborough (after having travelled from one end of America to the other), lived retired on a small estate which he cultivated. The Doctor was the second of five children (four sons and a daughter), and received his education under the care of his grandfather Thomas Hough, a person of fortune in Cheshire (which gave him a predilection for that county), and at Sedburg in Yorkshire. He afterwards served his time to one Mr Bartlett an apothecary at Bradford. From thence he removed to London, and became a pupil of Dr (afterwards Sir Edward) Wilmot, at St Thomas's Hospital. He then went to the university of Edinburgh to study physic, and took his doctor's degree there. From Edinburgh he went to Leyden; whence, after a short stay, he returned to London, and began to practise about the year 1740, in

Foster
||
Fothergill.

Fothergill in a house in White-hart Court, Lombard-street, where he resided during the greatest part of his life, and acquired most of his fortune. In 1746, he was admitted a licentiate of the college of physicians in London; and in 1754 a fellow of that of Edinburgh, to which he was a considerable benefactor. He afterwards became a member of the Royal Medical Society at Paris, and a member both of the Royal and Antiquarian Societies. He continued his practice with uninterrupted success till within the last two years of his life, when the illness which he had brought on himself by unremitted attention, obliged him to give up a considerable part of it. Besides his application to medical science, he had imbibed an early taste for natural history, improved by his friend Peter Collinson, and employed himself on coquillage and smaller objects of botany. He was for many years a valuable contributor to the Gentleman's Magazine; where his observations on the weather and diseases were begun in April 1751, and discontinued in the beginning of 1756, being disappointed in his views of exciting other experienced physicians in different parts to imitate the example. He had very extensive practice, but he did not add to his art any great or various improvements. His pamphlet on the ulcerous fore throat is, on every account, the best of his publications; but owes much of its merit to the information of the late Dr Letherland. It was first printed in 1748, on the re-appearance of that fatal disorder which in 1739 had carried off the two only sons of Mr Pelham. In 1762 Dr Fothergill purchased an estate at Upton in Essex; and formed a botanic garden there, the second in Europe: Kew is the first. In 1766 he began regularly to withdraw, from Midsummer to Michaelmas, from the excessive fatigue of his profession, to Lee-Hall, near Middlewich, in Cheshire; which, though he only rented it by the year, he had spared no expence to improve. He took no fees during this recess, but attended to prescribe gratis at an inn at Middlewich once a-week. In 1767, after he found himself obliged to relax his attention to business, he removed from his house in the city, to reside in Harpur-street, Red-Lion Square. Some time before his death he had been industrious to contrive a method of generating and preserving ice in the West-Indies. He was the patron of Sidney Parkinson, and drew up the preface prefixed to his account of the voyage to the South Seas. At his expence also was made and printed an entire new translation of the whole Bible, from the Hebrew and Greek originals, by Anthony Purver, a quaker, in two volumes, 1764, folio, and also, in 1780, an edition of bishop Percy's "Key to the New Testament," adapted to the use of a seminary of young Quakers, at Acworth, near Leeds in Yorkshire, founded in 1778 by the Society, who purchased, by a subscription in which Dr Fothergill stood foremost, the house and an estate of thirty acres which the Foundling Hospital held there, but which they found inconvenient for their purpose on account of distance. The Doctor himself first projected this on the plan of a smaller institution of the same kind at Gilderfomes. He also endowed it handsomely by his will. It now contains above 300 children of both sexes, who are clothed and instructed. Among the other beneficent schemes suggested by Dr Fothergill were those of bringing fish to London by land car-

riage, which, though it did not in every respect succeed, tended to destroy a supposed combination; and of rendering bread much cheaper, though equally wholesome, to the poor, by making it with one part of potatoes and three parts of household flour. But his public benefactions, his encouragements of science, the instances of his attention to the health, the police, the convenience of the metropolis, &c. we cannot pretend to specify. The fortune which Dr Fothergill had acquired was immense; and, taking all things together, the house and moveables in Harpur-street, the property in Essex, and the estate in Cheshire (which he held on a lease), and his ready money, amounted to L.80,000. His business when he was in full practice was calculated at near L. 7000 per annum. In the influenza of 1775 and 1776, he is said to have had 60 patients on his list daily, and his profit was estimated at L. 8000 per annum.

The disorder which hastened his death was a scirrhus of the prostate, and an obstruction in the bladder (in which were found after his death two quarts of water), which had been gradually coming on him for six years past, occasioned by a delicacy, which made him unwilling to alight from his carriage; and when, after his temporary recovery from it the year before he died, he submitted to use relief in his carriage, it was too late. He died at his house in Harpur-street, December 26. 1780; and his remains were interred, January 5. in the Quakers burying-ground at Winchmore-hill, whither they were accompanied by more than 70 coaches and post-chaises, notwithstanding the intention of the executors to have the funeral private. The Doctor by his will appointed, that his shells, and other pieces of natural history, should be offered to the late Dr Hunter at L. 500 under the valuation he ordered to be taken of them. Accordingly Dr Hunter bought them for L. 1200. The drawings and collections in natural history were also to be offered to Mr (now Sir Joseph) Banks at a valuation. His English portraits and prints, which had been collected by Mr John Nickolls of Ware, and purchased by him for 80 guineas, were bought for 200 guineas by Mr Thane. His books were sold by auction, April 30. 1781, and the eight following days. His house and garden at Upton, in which 15 men were constantly employed, were valued at L. 10,000. He spared no expence to augment this as well as his other collections. He had an ingenious artist qualified to collect for him at the Cape of Good Hope, and another on the Alps, and employed for several years before his death a painter in natural history at Leeds.

Dr Fothergill's character was excellent. A transaction, indeed, with regard to one Dr Leeds, gave occasion to some of his enemies to blame him; but how unjustly, has been abundantly shown by his biographers Dr Elliott and Dr Lettsome. Besides the pamphlet already mentioned, Dr Fothergill wrote a considerable number of Tracts, which are now collected into one volume 8vo, by Dr Elliott. He sometimes wrote in the newspapers, and is said to have been the author of more than 100 letters in the *Gazeteer* concerning the New Pavement.

FOTHERGILLA, in botany: A genus of the di-gynia order, belonging to the polyandria class of plants.

The

Fothering
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Foul.

The calyx is lobed, most entire; there is no corolla; the germen bifid; the capsule bilocular; and the cells two-valved; the seeds solitary and bony.

FOTHERING, a peculiar method of endeavouring to stop a leak in the bottom of a ship while she is afloat, either under sail or at anchor. It is usually performed in the following manner: A basket is filled with ashes, cinders, and chopped rope-yarns, and loosely covered with a piece of canvas; to this is fastened a long pole, by which it is plunged repeatedly in the water, as close as possible to the place where the leak is conjectured to lie. The oakum or chopped rope-yarns being thus gradually shaken through the twigs, or over the top of the basket, are frequently sucked into the hole along with the water, so that the leak becomes immediately choaked; and the future entrance of the water is thereby prevented.

FOTHERINGAY, a town of Northamptonshire, about four miles from Staneford, situated on the river Avon or Nen, and consisting of one street. Edward duke of York in the reign of Henry V. founded and endowed a fine collegiate church here, in which he was interred. At the Dissolution the college and the choir were pulled down, and the bodies of the founder and his family left exposed till queen Elizabeth's time, who ordered them to be interred, and the present monuments to be erected. On the north side of the church is a free school, founded by Henry VII. or Edward VI. endowed with *L.20 per annum* for a master, payable out of the exchequer by the receiver of the county. The bridge over the river here was first built by queen Elizabeth, 1573, of timber, with three pillars upon the foundation. Daniel, first earl of Nottingham, and the other trustees for William Saville, marquis of Halifax, rebuilt it, in 1722, of freestone from King's Cliffe. On the south-east side of the Cliffe stood the castle; which was of great antiquity and considerable strength. Mary queen of Scots, who had been in the custody of Sir Amias Powlet here, was tried and beheaded in the hall; and her son afterwards, forgiving and even taking into favour her greatest enemy Cecil, only took the childish revenge of beating down the castle; which he so completely demolished, that no more than the earthworks now remain. Within the first work is a farm-house with some carved stones wrought into it, and at the south-west corner of the inner trench are some masses of stone-walls. Sir Robert Cotton carried the wainscot of the hall to Connington.

FOU-TCHEOU, a city of China, in the province of FO-KIEN. It carries on a considerable trade; but is chiefly remarkable for the magnificence of its principal bridge, which has more than 100 arches, constructed of white stone, and ornamented with a double balustrade throughout. This city is the residence of a viceroy, and has under its jurisdiction nine cities of the third class.

FOUGADE, or **FOUGASSE**, in the art of war, a little mine, about 8 or 10 feet wide, and 10 or 12 deep, dug under some work or post, which is in danger of falling into the enemy's hands; and charged with sacks of powder, covered with stones, earth, and whatever else can make great destruction. It is set on fire like other mines, with a faucisse. See **MINE**.

FOUL, or **FOULE**, in the sea-language, is used when a ship has been long untrimmed, so that the

Nº 130.

grass-weeds, or barnacles, grow to her sides under water. A rope is also foul when it is either tangled in itself, or hindered by another, so that it cannot run or be over-hawled.

Foul imports, also, the running of one ship against another. This happens sometimes by the violence of the wind, and sometimes by the carelessness of the people on board, to ships in the same convoy, and to ships in port by means of others coming in. The damages occasioned by running foul, are of the nature of those in which both parties must bear a share. They are usually made half to fall upon the sufferer, and half upon the vessel which did the injury: but in cases where it is evidently the fault of the master of the vessel, he alone is to bear the damage.

Foul-Water. A ship is said to make foul-water, when, being under sail, she comes into such shoal-water, that though her keel do not touch the ground, yet it comes so near it, that the motion of the water under her raises the mud from the bottom.

Foul is also a disease in cattle, proceeding from blood, and a watery rheum that falls down into the legs, and makes them swell.

Foul or **Pimpled Face**. See **GUTTA Rosacea**.

FOULA, or **Foul Island**, one of the Shetland isles, lying between six and seven leagues west from the main land. It is about three miles long, narrow, and full of rough, steep, and bare rocks; one of which is so large, and runs up to such an height, that it may be clearly seen from Orkney. This, therefore, may be reckoned with the greatest probability to be the Thule of Tacitus, whatever might be the Thule of the Phenicians and Greeks. It has scarce any pasturage, and but very little arable land; but that, however small in extent, is very fertile, out of the produce of which, with fowl and fish, the poor inhabitants subsist. They have nothing that can be called a port; and the only commodities they have are stock-fish, train-oil, and feathers.

FOUMART, in zoology, a species of **MUSTELA**.

FOUNDATION, in architecture, is that part of a building which is under-ground. See **ARCHITECTURE**, n° 96 *et seq.* and n° 130, &c.

Palladio allows a sixth part of the height of the whole building for the hollowing or under-digging; unless there be cellars under ground, in which case he would have it somewhat lower.

FOUNDATION, denotes also a donation or legacy, either in money or lands, for the maintenance and support of some community, hospital, school, &c.

The king only can found a college, but there may *Jacob's* be a college in reputation founded by others. If it *Law Dict.* cannot appear by inquiry who it was that founded a church or college, it shall be intended that it was the king, who has power to found a new church, &c. The king may found and erect an hospital, and give a name to the house upon the inheritance of another, or license another person to do it upon his own lands; and the words *fundo*, *creo*, &c. are not necessary in every foundation, either of a college or hospital, made by the king; but it is sufficient if there be words equivalent: the incorporation of a college or hospital is the very foundation; but he who endows it with lands is the founder; and to the erection of an hospital, nothing more is requisite but the incorporation and foundation.

Persons

Foul
||
Foundation.

Founder,
Foundry.

Persons seized of estates in fee-simple, may erect and found hospitals for the poor by deed enrolled in chancery, &c. which shall be incorporated, and subject to such visitors as the founder shall appoint, &c. stat. 39 Eliz. c. 5.

FOUNDER, in a general sense, the person who lays a foundation, or endows a church, school, religious house, or other charitable institution. See **FOUNDATION**.

FOUNDER, also implies an artist who casts metals, in various forms, for different uses, as guns, bells, statues, printing-characters, candlesticks, buckles, &c. whence they are denominated gun-founders, bell-founders, figure-founders, letter-founders, founders of small works, &c. See **FOUNDERY**.

FOUNDER, in the sea-language: A ship is said to founder, when by an extraordinary leak, or by a great sea breaking in upon her, she is so filled with water, that she cannot be freed of it; so that she can neither veer nor steer, but lie like a log; and not being able to swim long, will at last sink.

FOUNDERED, in farriery. See there, § xli.

FOUNDERY, or **FOUNDRY**, the art of casting all sorts of metals into different forms. It likewise signifies the work-house or smelting-hut wherein these operations are performed.

Foundry of Small Works, or Casting in Sand. The sand used for casting small-works is at first of a pretty soft, yellowish, and clammy nature: but it being necessary to strew charcoal-dust in the mould, it at length becomes of a quite black colour. This sand is worked over and over, on a board, with a roller, and a sort of knife; being placed over a trough to receive it, after it is by these means sufficiently prepared.

This done, they take a wooden board of a length and breadth proportional to the things to be cast, and putting a ledge round it, they fill it with sand, a little moistened, to make it duly cohere. Then they take either wood or metal models of what they intend to cast, and apply them so to the mould, and press them into the sand, as to leave their impression there. Along the middle of the mould is laid half a small brass cylinder, as the chief canal for the metal to run through, when melted, into the models or patterns; and from this chief canal are placed several others, which extend to each model or pattern placed in the frame. After this frame is finished, they take out the patterns, by first loosening them all round, that the sand may not give way.

Then they proceed to work the other half of the mould with the same patterns in just such another frame; only that it has pins, which, entering into holes that correspond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame, thus moulded, is carried to the melter; who, after extending the chief canal of the counter-part, and adding the cross canals to the several models in both, and strewing mill-dust over them, dries them in a kind of oven for that purpose.

Both parts of the mould being dry, they are joined together by means of the pins; and to prevent their giving way, by reason of the melted metal passing thro' the chief cylindrical canal, they are screwed or wedged up like a kind of press.

While the moulds are thus preparing, the metal is

fusing in a crucible of a size proportionate to the quantity of metal intended to be cast. Foundry.

When the moulds are coolish, the frames are unscrewed, or unwedged, and the cast work taken out of the sand, which sand is worked over again for other castings.

Foundry of Statues. The casting of statues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuse the metal. The pit is a hole dug in a dry place something deeper than the intended figure, and made according to the prominence of certain parts thereof. The inside of the pit is commonly lined with stone, or brick; or, when the figure is very large, they sometimes work on the ground, and raise a proper fence to resist the impulsion of the melted metal.

The inner mould, or core, is a rude mass to which is given the intended attitude and contours. It is raised on an iron grate, strong enough to sustain it, and is strengthened within by several bars of iron. It is generally made either of potter's clay, mixed with hair and horse-dung; or of plaster of Paris mixed with brick-dust. The use of the core is to support the wax, the shell, and lessen the weight of the metal. The iron bars and the core are taken out of the brass figure through an aperture left in it for that purpose, which is soldered up afterwards. It is necessary to leave some of the iron bars of the core, that contribute to the steadiness of the projecting part, within the brass figure.

The wax is a representation of the intended statue. If it be a piece of sculpture, the wax should be all of the sculptor's own hand, who usually forms it on the core: Though it may be wrought separately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant space in the middle with liquid plaster and brick-dust, whereby the inner core is proportioned as the sculptor carries on the wax.

When the wax, which is the intended thickness of the metal, is finished, they fill small waxen tubes perpendicular to it from top to bottom, to serve both as canals for the conveyance of the metal to all parts of the work; and as vent-holes, to give passage to the air, which would otherwise occasion great disorder when the hot metal came to encompass it.

The work being brought thus far, must be covered with its shell, which is a kind of crust laid over the wax, and which being of a soft matter, easily receives the impression of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the shell and the mould. The matter of this outer mould is varied according as different layers are applied. The first is generally a composition of clay, and old white crucibles well ground and sifted; and mixed up with water to the consistence of a colour fit for painting: accordingly they apply it with a pencil, laying it seven or eight times over, and letting it dry between whites. For the second impression, they add horse-dung and natural earth to the former composition. The third impression is only horse-dung and earth. Lastly, the shell is finished by laying on several more impressions of this last matter, made very thick with the hand.

The shell, thus finished, is secured by several iron

Foundry. girths, bound round it, at about half a foot distance from each other, and fastened at the bottom to the grate under the statue, and at top to a circle of iron where they all terminate.

If the statue be so big that it would not be easy to move the moulds with safety, they must be wrought on the spot where it is to be cast. This is performed two ways: in the first, a square hole is dug under ground, much bigger than the mould to be made therein, and its inside lined with walls of free-stone or brick. At the bottom is made a hole of the same materials, with a kind of furnace, having its aperture outwards: in this is a fire made to dry the mould, and afterwards melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Lastly, at one of the edges of the square pit, is made another large furnace to melt the metal. In the other way, it is sufficient to work the mould above ground, but with the like precaution of a furnace and grate underneath. When finished, four walls are to be run around it, and by the side thereof a massive made for a melting-furnace. For the rest the method is the same in both. The mould being finished, and inclosed as described, whether under ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks, that the wax may melt gently down, and run out at pipes contrived for that purpose, at the foot of the mould, which are afterwards exactly closed with earth, so soon as the wax is carried off. This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace augmented, till such time as both the bricks and mould become red hot. After this, the fire being extinguished, and every thing cold again, they take out the bricks, and fill up their place with earth moistened, and a little beaten to the top of the mould, in order to make it the more firm and steady. These preparatory measures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above described, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From this last aperture, which is kept very close, while the metal is in fusion, a small tube is laid, whereby the melted metal is conveyed into a large earthen basin, over the mould, into the bottom of which all the big branches of the jets, or casts, which are to convey the metal into all the parts of the mould, are inserted.

These casts or jets are all terminated with a kind of plugs, which are kept close, that, upon opening the furnace, the brass, which gushes out with violence, may not enter any of them, till the basin be full enough of matter to run into them all at once. Upon which occasion they pull out the plugs, which are long iron rods with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an instant. This completes the work in relation to the casting part; the rest being the sculptor's or carver's business, who, taking the figure out of the mould and earth wherewith it is encompassed, saws off the jets with which it appears covered over, and repairs it with chisels, gravers, punchcons, &c.

Foundry. *FOUNDRY of Bells.* The metal, it is to be observed, is different for bells from what it is for statues; there being no tin in the statue-metal: but there is a fifth, and sometimes more, in the bell-metal.

The dimensions of the core and the wax for bells, if a ring of bells especially, are not left to chance, but must be measured on a scale, or diapason, which gives the height, aperture, and thickness, necessary for the several tones required.

It is on the wax that the several mouldings and other ornaments and inscriptions, to be represented in relief on the outside of the bell, are formed. The clapper or tongue is not properly a part of the bell, but is furnished from other hands. In Europe, it is usually of iron, with a large knob at the extreme; and is suspended in the middle of the bell. In China, it is only a huge wooden mallet, struck by force of arm against the bell; whence they can have but little of that consonancy so much admired in some of our rings of bells. The Chinese have an extraordinary way of increasing the sound of their bells; viz. by leaving a hole under the cannon; which our bell-founders would reckon a defect.

The proportions of our bells differ very much from those of the Chinese. In ours, the modern proportions are, to make the diameter 15 times the thickness of the brim, and the height 12 times. The parts of a bell are, 1. The sounding bow, terminated by an inferior circle, which grows thinner and thinner, 2. The brim or that part of a bell whereon the clapper strikes, and which is thicker than the rest. 3. The outward sinking of the middle of the bell, or the point under which it grows wider to the brim. 4. The waist or furniture, and the part that grows wider and thicker quite to the brim. 5. The upper vase, or that part which is above the waist. 6. The pallet which supports the staple of the clapper within. 7. The bent and hollowed branches of metal uniting with the cannons, to receive the iron keys, whereby the bell is hung up to the beam, which is its support and counterpoise, when rung out.

The business of bell-foundry is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould. And, 3. The melting of the metal. There are two kinds of proportions, viz. the simple and the relative; the former are those proportions only that are between the several parts of a bell to render it sonorous; the relative proportions establish a requisite harmony between several bells.

The method of forming the profile of a bell, previous to its being cast, in which the proportion of the several parts may be seen, is as follows: the thickness of the brim, C*i* (Plate CXC*v*.) is the foundation of every other measure, and is divided into three equal parts. First, draw the line HD, which represents the diameter of the bell; bisect it in F and erect the perpendicular FF*f*; let DF and HF be also bisected in E and G, and two other perpendiculars E*e*, G*a*, be erected at E and G: GE will be the diameter of the top or upper vase, *i. e.* the diameter of the top will be half that of the bell; and it will, therefore, be the diameter of a bell which will sound an octave to the other. Divide the diameter of the bell or the line HD into 15 equal parts, and one of these will give C*i* the thickness of the brim; divide again each of these

Foundry

Foundry.

these 15 equal parts into three other equal parts, and then form a scale. From this scale take 12 of the larger divisions or $\frac{2}{3}$ of the whole scale in the compass, and setting one leg in D describe an arc to cut the line E e in N; draw ND, and divide this line into 12 equal parts; at the point 1 erect the perpendicular $1C = 10$, and C1 will be the thickness of the brim $= \frac{1}{3}$ of the diameter: draw the line CD: bisect DN; and at the point of bisection 6 erect the perpendicular $6K = \frac{1}{3}$ of the larger divisions on the scale. With an opening of the compass equal to twice the length of the scale or 30 brims, setting one leg in N, describe an arc of a circle, and with the same leg in K and the same opening describe another arc to intersect the former: on this point of intersection as a centre, and with a radius equal to 30 brims, describe the arc NK; in 6 K produced take $KB = \frac{1}{3}$ of the larger measure of the scale or $\frac{1}{3}$ of the brim, and on the same centre with the radius $30\frac{1}{3}$ brims describe an arc AB parallel to NK. For the arc BC, take 12 divisions of the scale or 12 brims in the compass; find a centre, and from that centre, with this opening, describe the arc BC; in the same manner as NK or AB were described. There are various ways of describing the arc Kp; some describe it on a centre at the distance of nine brims from the points p and K; others, as it is done in the figure, on a centre at the distance only of seven brims from those points. But it is necessary first to find the point p, and to determine the rounding of the bell p i. For this purpose, on the point C as a centre, and with the radius C1, describe the arc 1 p n; bisect the part 1, 2 of the line D n, and erecting the perpendicular p m, this perpendicular will cut the arc 1 p n in m, which terminates the rounding 1 p. Some founders make the bendings K a third of a brim lower than the middle of the line D N; others make the part C 1 D more acute, and instead of making C1 perpendicular to DN at 1, draw it $\frac{1}{8}$ th of a brim higher, making it still equal to one brim; so that the line 1 D is longer than the brim C 1. In order to trace out the top-part Na, take in the compass eight divisions of the scale or eight brims, and on the points N and D as centres, describe arcs to intersect each other in 8: on this point 8, with a radius of eight brims, describe the arc Nb; this arc will be the exterior curve of the top or crown: on the same point 8 as a centre, and with a radius equal to $7\frac{2}{3}$ brims, describe the arc Ae, and this will be the interior curve of the crown, and its whole thickness will be one third of the brim. As the point 8 does not fall in the axis of the bell, a centre M may be found in the axis by describing, with the interval of eight brims on the centres D and H, arcs which will intersect in M; and this point may be made the centre of the inner and outer curves of the crown as before. The thickness of the cap which strengthens the crown at Q is about one-third of the thickness of the brim; and the hollow branches or ears about one-sixth of the diameter of the bell. The height of the bell is in proportion to its diameter as 12 to 15, or in the proportion of the fundamental sound to its third major: whence it follows, that the sound of a bell is principally composed of the sound of its extremity or brim, as a fundamental of the sound of the crown which is an octave to it, and of that of the height which is a third.

The particulars necessary for making the mould of

a bell are, 1. The earth: the most cohesive is the best; it must be well ground and sifted, to prevent any chinks. 2. Prick-stone; which must be used for the mæ, mould, or core, and for the furnace. 3. Horse-dung, hair, and hemp, mixed with the earth, to render the cement more binding. 4. The wax for inscriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a slight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a scaffold consisting of four boards, ranged upon tressels. Upon this they carry the earth, grossly diluted, to mix it with horse-dung, beating the whole with a large spatula.

The compasses of construction is the chief instrument for making the mould, which consist of two different legs joined by a third piece. And last of all, the founders shelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They first dig a hole of a sufficient depth to contain the mould of the bell, together with the case or cannon, under ground; and about six inches lower than the terreplain, where the work is performed. The hole must be wide enough for a free passage between the mould and walls of the hole, or between one mould and another, when several bells are to be cast. At the centre of the hole is a stake erected, that is strongly fastened in the ground. This supports an iron peg, on which the pivot of the second branch of the compasses turns. The stake is encompassed with a solid brick-work, perfectly round, about half a foot high, and of the proposed bell's diameter. This they call a *mill-stone*. The parts of the mould are, the core, the model of the bell, and the shell. When the outer surface of the core is formed, they begin to raise the core, which is made of bricks that are laid in courses of equal height upon a lay of plain earth. At the laying of each brick, they bring near it the branch of the compasses, on which the curve of the core is shaped, so as that there may remain between it and the curve the distance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horse-dung; on which they move the compasses of construction, to make it of an even smoothness every where.

The first layer being finished, they put the fire to the core, by filling it half with coals, through an opening that is kept shut, during the baking, with a cake of earth that has been separately baked. The first fire consumes the stake, and the fire is left in the core half or sometimes a whole day: the first layer being thoroughly dry, they cover it with a second, third, and fourth; each being smoothed by the board of the compasses, and thoroughly dried before they proceed to another.

The core being completed, they take the compasses to pieces, with intent to cut off the thickness of the model, and the compasses are immediately put in their place to begin a second piece of the mould. It consists of a mixture of earth and hair, applied with the hand on the core, in several cakes that close together. This work is finished by several layers of a thinner cement of the same matter, smoothed by the compasses,

Foundery. and thoroughly dried before another is laid on. The first layer of the model is a mixture of wax and grease spread over the whole. After which are applied the inscriptions, coats of arms, &c. besmeared with a pencil dipped in a vessel of wax in a chafing-dish: this is done for every letter. Before the shell is begun, the compasses are taken to pieces, to cut off all the wood that fills the place of the thickness to be given to the shell.

The first layer is the same earth with the rest, sifted very fine; whilst it is tempering in water, it is mixed with cow's hair to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the sinuosities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they cover it with a second of the same matter, but somewhat thicker; when this second layer becomes of some consistence, they apply the compasses again, and light a fire in the core, so as to melt off the wax of the inscriptions, &c.

After this, they go on with other layers of the shell, by means of the compasses. Here they add to the cow's hair a quantity of hemp, spread upon the layers, and afterwards smoothed by the board of the compasses. The thickness of the shell comes to four or five inches lower than the mill-stone before observed, and surrounds it quite close, which prevents the extravasation of the metal. The wax should be taken out before the melting of the metal.

The ear of the bell requires a separate work, which is done during the drying of the several incrustations of the cement. It has seven rings: the seventh is called the *bridge*, and unites the others, being a perpendicular support to strengthen the curves. It has an aperture at the top, to admit a large iron peg, bent at the bottom; and this is introduced into two holes in the beam, fastened with two strong iron keys. There are models made of the rings, with masses of beaten earth, that are dried in the fire, in order to have the hollow of them. These rings are gently pressed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated 12 times for 12 half-moulds, that two and two united may make the hollows of the six rings: the same they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that constitute the ear. They first put into this open place the iron-ring to support the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickness of the core. This cake, after baking, is clapped upon the opening, and folded with a thin mortar spread over it, which binds the cover close to the core.

The hollow of the model is filled with an earth, sufficiently moist to fix on the place, which is strewed at several times upon the cover of the core; and they beat it gently with a peltle, to a proper height; and a workman smooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they assemble the hollows of the rings. When every thing is in its proper place, they strengthen the outside of the hollows with mortar, in order to bind them with the

Foundery. bridge, and keep them steady at the bottom, by means of a cake of the same mortar, which fills up the whole aperture of the shell. This they let dry, that it may be removed without breaking. To make room for the metal, they pull off the hollows of the rings, through which the metal is to pass, before it enters into the vacuity of the mould. The shell being unloaded of its ear, they range under the millstone five or six pieces of wood, about two feet long, and thick enough to reach almost the lower part of the shell; between these and the mould, they drive in wooden wedges with a mallet, to shake the shell of the model whereon it rests, so as to be pulled up and got out of the pit.

When this and the wax are removed, they break the model and the layer of earth, through which the metal must run, from the hollow of the rings, between the shell and the core. They smoke the inside of the shell, by burning straw under it, that helps to smooth the surface of the bell. Then they put the shell in the place, so as to leave the same interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a mass of baked cement. After which they put on this mass of the cap, the rings, and the vent, over the shell, and solder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it strongly all the time round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney with a spacious ash-hole. The furnace which contains the metal is vaulted, whose bottom is made of earth, rammed down; the rest is built with brick. It has four apertures; the first, through which the flame revivifies; the second is closed with a stopple that is opened for the metal to run; the others are to separate the dross or scoriae of the metal by wooden rakes: through these last apertures passes the thick smoke. The ground of the furnace is built sloping, for the metal to run down.

Foundery of Great Guns and Mortar-Pieces. The method of casting these pieces is little different from that of bells: they are run massy, without any core, being determined by the hollow of the shell; and they are afterwards bored with a steel trepan, that is worked either by horses or a water-mill.

For the metal, parts, proportions, &c. of these pieces, see **GUNNERY**.

Letter-Foundery, or Casting of Printing-Letters.

In the business of cutting, casting, &c. letters for printing, the letter-cutter must be provided with a vice, hand-vice, hammers, and files of all sorts for watch-makers use; as also gravers and sculptors of all sorts, and an oil-stone, &c. suitable and sizeable to the several letters to be cut: a flat gage made of box to hold a rod of steel, or the body of a mould, &c. exactly perpendicular to the flat of the using-file: a sliding-gage whose use is to measure and set off distances between the shoulder and the tooth, and to mark it off from the end, or from the edge of the work: a face-gage, which is a square notch cut with a file into the edge of a thin plate of steel, iron, or brass, of the thickness of a piece of common tin, whose use is to proportion the face of each sort of letter, viz. long letters, ascending

Foundery. cending letters, and short letters. So there must be three gages, and the gage for the long letters is the length of the whole body supposed to be divided into 42 equal parts. The gage for the ascending letters Roman and Italic are $\frac{5}{7}$, or 30 parts of 42, and 33 parts for the English face. The gage for the short letters is $\frac{1}{4}$, or 18 parts of 42 of the whole body for the Roman and Italic, and 22 parts for the English face.

The Italic and other standing gages are to measure the scope of the Italic stems, by applying the top and bottom of the gage to the top and bottom lines of the letters, and the other side of the gage to the stem; for when the letter complies with these three sides of the gage, that letter has its true shape.

The next care of the letter-cutter is to prepare good steel punches, well tempered, and quite free from all veins of iron; on the face of which he draws or marks the exact shape of the letter with pen and ink if the letter be large, or with a smooth blunted point of a needle if it be small; and then with sizeable and proper shaped and pointed gravers and sculpters, digs or sculps out the steel between the strokes or marks he made on the face of the punch, and leaves the marks standing on the face. Having well shaped the inside strokes of his letter, he deepens the hollows with the same tools; for if a letter be not deep in proportion to its width, it will, when used at press, print black, and be good for nothing. This work is generally regulated by the depth of the counter-punch. Then he works the outside with proper files till it be fit for the matrice.

But before we proceed to the sinking and justifying of the matrices, we must provide a mould to justify them by, of which you have a draught in Plate CXCV. fig. 1. 2.

Every mould is composed of an upper and an under part. The under part is delineated in fig. 1. The upper part is marked fig. 2. and is in all respects made like the under part, excepting the stool behind, and the bow or spring also behind; and excepting a small roundish wire between the body and carriage, near the break, where the under part hath a small rounding groove made in the body. This wire, or rather half-wire, in the upper part makes the nick in the shank of the letter, when part of it is received into the groove in the under part. These two parts are so exactly fitted and gaged into one another (*viz.* the male-gage marked *c* in fig. 2. into the female marked *g* in fig. 1. that when the upper part of the mould is properly placed on, and in the under part of the mould, both together make the entire mould, and may be slid backwards for use so far, till the edge of either of the bodies on the middle of either carriage comes just to the edge of the female gages cut in each carriage: and they may be slid forward so far, till the bodies on either carriage touch each other: and the sliding of these two parts of the mould backwards makes the shank of the letter thicker, because the bodies in each part stand wider asunder; and the sliding them forwards makes the shank of the letter thinner, because the bodies on each part of the mould stand closer together. The parts of the mould are as follow: *viz.* a, The carriage. b, The body. c, The male gage. d, e, The mouth-piece. f, The register. g, The female gage. h, The hanger. *aaaa*, The bottom plate. *bbb*, The wood on which

the bottom plate lies. *ccc*, The mouth. *dd*, The throat. *edd*, The pallat. *f*, The nick. *gg*, The stool. *hh*, The spring or bow.

Then the mould must be justified: and first the founder justifies the body, by casting about 20 proofs or samples of letters; which are set up in a composing stick, with all their nicks towards the right hand; and then by comparing these with the pattern letters, set up in the same manner, he finds the exact measure of the body to be cast. He also tries if the two sides of the body are parallel, or that the body be no bigger at the head than at the foot, by taking half the number of his proofs and turning them with their heads to the feet of the other half; and if then the heads and the feet be found exactly even upon each other, and neither to drive out nor get in, the two sides may be pronounced parallel. He farther tries whether the two sides of the thickness of the letter be parallel, by first setting his proofs in the composing stick with their nicks upwards, and then turning one half with their heads to the feet of the other half; and if the heads and feet lie exactly upon each other, and neither drive out nor get in, the two sides of the thickness are parallel.

The mould thus justified, the next business is to prepare the matrices. A matrice is a piece of brass or copper of about an inch and a half long, and of a thickness in proportion to the size of the letter it is to contain. In this metal is sunk the face of the letter intended to be cast, by striking the letter punch about the depth of an n. After this the sides and face of the matrice must be justified and cleared with files of all buncchings made by sinking the punch.

Every thing thus prepared, it is brought to the furnace; which is built of brick upright, with four square sides, and a stone on the top, in which stone is a wide round hole for the pan to stand in. A foundery of any consequence has several of these furnaces in it.

As to the metal of which the types are to be cast, this, in extensive founderies, is always prepared in large quantities; but cast into small bars, of about 20 pounds weight, to be delivered out to the workmen as occasion requires. In the letter foundery which has been long carried on with reputation under the direction of Dr Alex. Wilson and sons at Glasgow, we are informed, that a stock of metal is made up at two different times of the year, sufficient to serve the casters at the furnace for six months each time. For this purpose, a large furnace is built under a shade, furnished with a wheel vent, in order the more equally to heat the sides of a strong pot of cast-iron, which holds when full 15 hundred weight of the metal. The fire being kindled below, the bars of lead are let softly down into the pot, and their fusion promoted by throwing in some pitch and tallow, which soon inflame. An outer chimney, which is built so as to project about a foot over the farthest lip of the pot, catches hold of the flame by a strong draught, and makes it act very powerfully in melting lead; whilst it serves at the same time to convey away all the fumes, &c. from the workmen, to whom this laborious part of the business is committed. When the lead is thoroughly melted, a due proportion of the regulus of antimony and other ingredients are put in, and some more tallow is inflamed to make the whole incorporate sooner. The workmen now having mixed the contents of the pot very thoroughly

Foundry. roughly by stirring long with a large iron ladle, next proceed to draw the metal off into the small troughs of cast-iron, which are ranged to the number of four-score upon a level platform faced with stone, built towards the right hand. In the course of a day 15 hundred weight of metal can be easily prepared in this manner; and the operation is continued for as many days as are necessary to prepare a stock of metal of all the various degrees of hardness. After this, the whole is disposed into presses according to its quality, to be delivered out occasionally to the workmen.

The founder must now be provided with a ladle, which differs nothing from other iron ladles but in its size; and he is provided always with ladles of several sizes, which he uses according to the size of the letters he is to cast. Before the caster begins to cast, he must kindle his fire in the furnace to melt the metal in the pan. Therefore he takes the pan out of the hole in the stone, and there lays in coals and kindles them; and, when they are well kindled, he sets the pan in again, and puts in metal into it to melt: if it be a small-bodied letter he casts, or a thin letter of great bodies, his metal must be very hot; nay sometimes red-hot, to make the letter come. Then having chosen a ladle than will hold about so much as the letter and break is, he lays it at the stoking-hole, where the flame bursts out, to heat. Then he ties a thin leather, cut with its narrow end against the face to the leather groove of the matrice, by whipping a brown thread twice about the leather-groove, and fastening the thread with a knot. Then he puts both halves of the mould together, and puts the matrice into the matrice-cheek, and places the foot of the matrice on the stool of the mould, and the broad end of the leather upon the wood of the upper half of the mould, but not tight up, lest it might hinder the foot of the matrice from sinking close down upon the stool in a train of work. Then laying a little rosin on the upper wood of the mould, and having his casting-ladle hot, he with the boiling side of it melts the rosin: and, when it is yet melted, presses the broad end of the leather hard down on the wood, and so fastens it to the wood; all this is the preparation.

Now he comes to casting. Wherefore, placing the under half of the mould in his left hand, with the hook or hag forward, he clutches the ends of its wood between the lower part of the ball of his thumb and his three hind fingers; then he lays the upper half of the mould upon the under half, so that the male gages may fall into the female gages, and at the same time the foot of the matrice places itself upon the stool; and, clasping his left-hand thumb strong over the upper half of the mould, he nimbly catches hold of the bow or spring with his right-hand fingers at the top of it, and his thumb under it, and places the point of it against the middle of the notch in the backside of the matrice, pressing it as well forwards towards the mould, as downwards by the shoulder of the notch close upon the stool, while at the same time with his hinder fingers, as aforesaid, he draws the under half of the mould towards the ball of his thumb, and thrusts by the ball of his thumb the upper part towards his fingers, that both the registers of the mould may press against both sides of the matrice, and his thumb and fingers press both halves of the mould close together.

Foundry. Then he takes the handle of his ladle in his right hand, and with the boll of it gives a stroke, two or three, outwards upon the surface of the melted metal, to scum or clear it from the film or dust that may swim upon it; then takes up the ladle full of metal, and having his mould, as aforesaid, in his left hand, he a little twists the left side of his body from the furnace, and brings the geat of his ladle (full of metal) to the mouth of the mould, and twists the upper part of his right hand towards him to turn the metal into it, while at the same moment of time he jilts the mould in his left hand forwards, to receive the metal with a strong shake (as it is called), not only into the body of the mould, but while the metal is yet hot running, swift and strongly, into the very face of the matrice, to receive its perfect form there, as well as in the shank.

Then he takes the upper half of the mould off the under half, by placing his right-hand thumb on the end of the wood next his left-hand thumb, and his two middle-fingers at the other end of the wood; and finding the letter and break lie in the under half of the mould (as most commonly by reason of its weight it does), he throws or tosses the letter, break and all, upon a sheet of waste paper laid for that purpose on the bench, just a little beyond his left hand, and is then ready to cast another letter as before; and also, the whole number that is to be cast with that matrice. A workman will ordinarily cast about three thousand of these letters in a day.

When the casters at the furnace have got a sufficient number of types upon the tables, a set of boys come and nimbly break away the jets from them: the jets are thrown into the pots, and the types are carried away in parcels to other boys, who pass them swiftly under their fingers, defended by leather, upon smooth flat stones, in order to polish their broad-sides. This is a very dexterous operation, and is a remarkable instance of what may be effected by the power of habit and long practice; for these boys, in turning up the other side of the type, do it so quickly by a mere touch of the fingers of the left hand, as not to require the least perceptible intermission in the motion of the right hand upon the stone. The types, thus finely smoothed and flattened on the broad-sides, are next carried to another set of boys, who sit at a square table, two on each side, and there are ranged up on long rulers or sticks, fitted with a small projection, to hinder them from sliding off backwards. When these sticks are so filled, they are placed, two and two, upon a set of wooden pins fixed into the wall, near the dresser, sometimes to the amount of an hundred, in order to undergo the finishing operations. This workman, who is always the most expert and skilful in all the different branches carried on at the foundry, begins by taking one of these sticks, and, with a peculiar address, slides the whole column of types off upon the dressing-stick: this is made of well-seasoned mahogany, and furnished with two end-pieces of steel, a little lower than the body of the types, one of which is moveable, so as to approach the other by means of a long screw-pin, inserted in the end of the stick. The types are put into this stick with their faces next to the back or projection; and after they are adjusted to one another so as to stand even, they are then bound up, by screwing home the moveable end-piece. It is here where the great

Foundry. great and requisite accuracy of the moulds comes to be perceived; for in this case the whole column, so bound up, lies flat and true upon the stick, the two extreme types being quite parallel, and the whole has the appearance of one solid continuous plate of metal. The least inaccuracy in the exact parallelism of the individual type, when multiplied so many times, would render it impossible to bind them up in this manner, by disposing them to rise or spring from the stick by the smallest pressure from the screw. Now, when lying so conveniently with the narrow edges uppermost, which cannot possibly be smoothed in the manner before mentioned by the stones, the workman does this more effectually by scraping the surface of the column with a thick-edged but sharp razor, which at every stroke brings on a very fine smooth skin, like to polished silver; and thus he proceeds till in about half a minute he comes to the farther end of the stick. The other edges of the types are next turned upwards, and polished in the same manner. It is whilst the types thus lie in the dressing-stick that the operation of bearding or barbing is performed, which is effected by running a plane, faced with steel, along the shoulder of the body next to the face, which takes more or less off the corner, as occasion may require. Whilst in the dressing-stick they are also grooved, which is a very material operation. In order to understand this, it must be remembered, that when the types are first broken off from the jets, some superfluous metal always remains, which would make them bear very unequally against the paper whilst under the printing-press, and effectually mar the impression. That all these inequalities may, therefore, be taken away, and that the bearings of every type may be regulated by the shoulders imparted to them all alike from the mould, the workman or dresser proceeds in the following manner. The types being screwed up in the stick, as before mentioned, with the jet-end outermost, and projecting beyond the wood about one-eighth of an inch, the stick is put into an open press, so as to present the jet-end uppermost, and then every thing is made fast by driving a long wedge, which bears upon a slip of wood, which lies close to the types the whole length: then a plough or plane is applied, which is so constructed as to embrace the projecting part of the types betwixt its long sides, which are made of polished iron. When the plane is thus applied, the steel cutter bearing upon that part between the shoulders of the types, where the inequalities lie, the dresser dexterously glides it along, and by this means strips off every irregular part that comes in the way, and so makes an uniform groove the whole length, and leaves the two shoulders standing; by which means every type becomes precisely like to another, as to the height against paper. The types being now finished, the stick is taken out of the press, and the whole column replaced upon the other stick; and after the whole are so dressed, he proceeds to pick out the bad letters, previous to putting them up into pages and papers. In doing this he takes the stick into his left hand, and turning the faces near to the light, he examines them carefully, and whenever an imperfect or damaged letter occurs, he nimbly plucks it out with a sharp bodkin, which he holds in the right hand for that purpose. Those letters which, from their form, project over the body of the type, and which

cannot on this account be rubbed on the stones, are scraped on the broad-sides with a knife or file, and some of the metal next the face pared away with a pen-knife, in order to allow the type to come close to any other. This operation is called *kerning*.

The excellence of printing types consists not only in the due performance of all the operations above described, but also in the hardness of the metal, form, and fine proportion of the character, and in the exact bearing and ranging of the letters in relation to one another.

FOUNT, or **FONT**, among printers, &c. a set or quantity of characters or letters of each kind, cast by a letter-founder, and sorted.—We say, a founder has cast a fount of pica, of english, of pearl, &c. meaning that he has cast a set of characters of these kinds.

A complete fount does not only include the running letters, but also large and small capitals, single letters, double letters, points, commas, lines, and numeral characters.

Founts are large or small, according to the demand of the printer, who orders them by the hundred weight, or by sheets. When the printer orders a fount of 500, he means that the fount should weigh 500 lb. When he demands a fount of 10 sheets, it is understood, that with that fount he shall be able to compose 10 sheets, or 20 forms, without being obliged to distribute. The founder takes his measures accordingly; he reckons 120 pounds for a sheet, including the quadrates, &c. or 60 pounds for a form, which is half a sheet: not that the sheet always weighs 120 pounds, or the form 60 pounds; on the contrary, it varies according to the size of the form; besides, it is always supposed that there are letters left in the cases.

The letter-founders have a kind of list, or tariff, whereby they regulate their founts: the occasion thereof is, that some letters being in much more use, and oftener repeated than others, their cells or cases, should be better filled and stored than those of the letters which do not return so frequently. Thus the *o* and *i*, for instance, are always in greater quantity than the *k* or *z*.

This difference will be best perceived from a proportional comparison of those letters with themselves, or some others. Suppose a fount of 100,000 characters, which is a common fount; here the *a* should have 5000, the *c* 3000, the *e* 11,000, the *i* 6000, the *m* 3000, the *k* only 30, and the *x*, *y*, and *z*, not many more. But this is only to be understood of the letters of the lower case; those of the upper having other proportions, which it would be, here, too long to insist on.

FOUNTAIN, a spring or source of water rising out of the earth. Among the ancients, fountains were generally esteemed as sacred; but some were held to be so in a more particular manner. The good effects received from cold baths gave springs and rivers this high reputation; for the salutary influence was supposed to proceed from some presiding deity. Particular reasons might occasion some to be held in greater veneration than others. It was customary to throw little pieces of money into those springs, lakes, or rivers, which were esteemed sacred, to render the presiding divinities propitious; as the touch of a naked boy

Fount,
Fountain.

Fountain. dy was supposed to pollute their hallowed waters. For the phenomena, theory, and origin, of fountains or springs, see SPRING.

Artificial FOUNTAIN, called also a *jet d'eau*, is a contrivance by which water is violently spouted upwards. See HYDRAULICS.

Boiling FOUNTAIN. See ICELAND.

FOUNTAIN-TREE, a very extraordinary vegetable growing in one of the Canary islands, and likewise said to exist in some other places, which distils water from its leaves in such plenty as to answer all the purposes of the inhabitants who live near it. Of this tree we have the following account in Glasse's history of the Canary islands.—“There are only three fountains of water in the whole island of Hierro, wherein the fountain-tree grows. One of these fountains is called *A-cof*, which, in the language of the ancient inhabitants, signifies *river*; a name, however, which does not seem to have been given it on account of its yielding much water, for in that respect it hardly deserves the name of a fountain. More to the northward is another called *Hapio*; and in the middle of the island is a spring, yielding a stream about the thickness of a man's finger. This last was discovered in the year 1565, and is called the *fountain of Anton. Hernandez*. On account of the scarcity of water, the sheep, goats, and swine, here do not drink in the summer, but are taught to dig up the roots of fern, and chew them to quench their thirst. The great cattle are watered at those fountains, and at a place where water distils from the leaves of a tree. Many writers have made mention of this famous tree, some in such a manner as to make it appear miraculous: others again deny the existence of any such tree; among whom is Father Feyjoo, a modern Spanish author, in his *Theatro Critico*. But he, and those who agree with him in this matter, are as much mistaken as those who would make it appear to be miraculous. This is the only island of all the Canaries which I have not been in; but I have sailed with natives of Hierro, who, when questioned about the existence of this tree, answered in the affirmative.

“The author of the *History of the discovery and conquest* has given us a particular account of it, which I shall here relate at large.

“The district in which this tree stands is called *Tigulabe*; near to which, and in the cliff or steep rocky ascent that surrounds the whole island, is a narrow gutter or gully, which commences at the sea, and continues to the summit of the cliff, where it joins or coincides with a valley, which is terminated by the steep front of a rock. On the top of this rock grows a tree, called in the language of the ancient inhabitants, *Garfe*, “Sacred or Holy Tree,” which for many years has been preserved sound, entire, and fresh. Its leaves constantly distil such a quantity of water as is sufficient to furnish drink to every living creature in Hierro; nature having provided this remedy for the drought of the island. It is situated about a league and a half from the sea. Nobody knows of what species it is, only that it is called *Til*. It is distinct from other trees, and stands by itself; the circumference of the trunk is about 12 spans, the diameter four, and in height from the ground to the top of the highest branch, 40 spans: the circumference of all the branches together is 120 feet. The branches are thick and extended;

Nº 130.

the lowest commence about the height of an ell from the ground. Its fruit resembles the acorn, and tastes something like the kernel of a pine-apple, but is softer and more aromatic. The leaves of this tree resemble those of the laurel, but are larger, wider, and more curved; they come forth in a perpetual succession, so that the tree always remains green. Near to it grows a thorn which fastens on many of its branches, and interweaves with them; and at a small distance from the garfe are some beech-trees, bresos, and thorns. On the north side of the trunk are two large tanks or cisterns, of rough stone, or rather one cistern divided, each half being 20 feet square, and 16 spans in depth. One of these contains water for the drinking of the inhabitants; and the other that which they use for their cattle, washing, and such-like purposes. Every morning, near this part of the island, a cloud or mist arises from the sea, which the south and easterly winds force against the fore-mentioned steep cliff; so that the cloud having no vent but by the gutter, gradually ascends it, and from thence advances slowly to the extremity of the valley, whence it is stopped and checked by the front of the rock which terminates the valley, and then rests upon the thick leaves and wide-spreading branches of the tree, from whence it distils in drops during the remainder of the day, until it is at length exhausted, in the same manner that we see water drip from the leaves of trees after a heavy shower of rain. This distillation is not peculiar to the garfe or til; for the bresos, which grow near it, likewise drop water; but their leaves being but few and narrow, the quantity is so trifling, that though the natives save some of it, yet they make little or no account of any but what distils from the til, which, together with the water of some fountains, and what is saved in the winter season, is sufficient to serve them and their flocks. This tree yields most water in those years when the Levant or easterly winds have prevailed for a continuance; for, by these winds only the clouds or mists are drawn hither from the sea. A person lives on the spot near which this tree grows, who is appointed by the council to take care of it and its water; and is allowed a house to live in, with a certain salary. He every day distributes to each family of the district seven pots or vessels full of water, besides what he gives to the principal people of the island.

“Whether the tree which yields water at this present time be the same as that mentioned in the above description, I cannot pretend to determine: but it is probable there has been a succession of them; for Pliny, describing the Fortunate island, says, ‘In the mountains of Ombrion are trees resembling the plant ferula, from which water may be procured by pressure. What comes from the black kind is bitter, but that which the white yields is sweet and potable.’”

Trees yielding water are not peculiar to the island of Hierro; for travellers inform us of one of the same kind on the island of St Thomas, in the bight or gulph of Guiney. In Cockburn's voyages we find the following account of a dropping tree, near the mountains of Fera Paz, in America.

“On the morning of the fourth day, we came out on a large plain, where were great numbers of fine deer, and in the middle stood a tree of unusual size, spreading its branches over a vast compass of ground.

Fountain
" "
Fourmont.

Curiosity led us up to it. We had perceived, at some distance off, the ground about it to be wet; at which we began to be somewhat surpris'd, as well knowing there had no rain fallen for near six months past, according to the certain course of the season in that latitude: that it was impossible to be occasioned by the fall of dew on the tree, we were convinced, by the sun's having power to exhale away all moisture of that nature a few minutes after its rising. At last, to our great amazement as well as joy, we saw water dropping, or as it were distilling, fast from the end of every leaf of this wonderful (nor had it been amiss if I had said *miraculous*) tree; at least it was so with respect to us, who had been labouring four days through extreme heat, without receiving the least moisture, and were now almost expiring for the want of it.

"We could not help looking on this as liquor sent from heaven to comfort us under great extremity. We catch'd what we could of it in our hands, and drank very plentifully of it; and lik'd it so well, that we could hardly prevail with ourselves to give over. A matter of this nature could not but incite us to make the strictest observations concerning it; and accordingly we staid under the tree near three hours, and found we could not fathom its body in five times. We observ'd the soil where it grew to be very strong; and upon the nicest inquiry we could afterwards make, both of the natives of the country and the Spanish inhabitants, we could not learn there was any such tree known throughout New Spain, nor perhaps all America over: but I do not relate this as a prodigy in nature, because I am not philosopher enough to ascribe any natural cause for it; the learned may perhaps give substantial reasons in nature for what appear'd to us a great and marvellous secret."

FOUQUIERES (James), an eminent painter, was born at Antwerp in 1580, and received his chief instructions from Velvet Brughel. He applied himself to the study of landscapes, and went to Italy to improve himself in colouring; and succeeded so happily, that his works are said to be nearly equal to those of Titian.—He was engag'd and much caress'd at the court of the elector Palatine, and afterwards spent several years of his life in France; where his works met with universal approbation, and he was proportionably well paid for his paintings. Yet by some misconduct he sunk into poverty, and died in the house of an inconsiderable painter in 1659. He had resid'd for several years at Rome and Venice, where he acquired that excellent style of colouring and design for which he is so deservedly distinguished.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a cross forked at the ends. See HERALDRY.

FOURMONT (Stephen), professor of the Arabic and Chinese languages, and one of the most learned men of his time, was born at Herbelai, a village four leagues from Paris, in 1683. He studied in Mazarine college, and afterwards in the Seminary of Thirtiethree. He was at length professor of Arabic in the Royal College, and was made a member of the Academy of Inscriptions. In 1738 he was chosen a member of the Royal Society in London, and of that of Berlin in 1741. He was often consult'd by the duke of Orleans, first prince of the blood; who had a

particular esteem for him, and made him one of his secretaries. He wrote a great number of books; the most considerable of those which have been printed are, 1. The Roots of the Latin Tongue, in verse. 2. Critical Reflections on the Histories of ancient Nations, 2 vols 4to. 3. *Meditationes Sinice*, folio. 4. A Chinese Grammar, in Latin, folio. 5. Several Dissertations printed in the Memoirs of the Academy of Inscriptions, &c. He died at Paris in 1745.

He ought not to be confounded with *Michael Fourmont*, his youngest brother; who took orders, was professor of the Syriac language in the Royal College, and a member of the Academy of Inscriptions. He died in 1746.

FOURNESS, in Loynsdale, Lancashire, is a track, between the Kent, Leven, and Dudden-Sands, which runs north parallel with the west sides of Cumberland and Westmoreland; and on the south runs out into the sea as a promontory. Here, as Mr Camden expresses it, "the sea, as if enraged at it, lashes it more furiously, and in high tides has even devoured the shore, and made three large bays; viz Kentsand, into which the river Ken empties itself; Levensand and Dudden-sand, between which the land projects in such a manner that it has its name thence; Foreness and Foreland, signifying the same with us as *promontorium anterius* in Latin." Bishop Gibson, however, derives the name of *Fourness*, or *Furness*, from the numerous furnaces that were there anciently, the rents and services of which (called *bloomsmithy rents*) are still paid. This whole tract, except on the coast, rises in high hills and vast piles of rocks called *Forness-Fells*; among which the Britans found a secure retreat, trusting to these natural fortresses, though nothing was inaccessible to the victorious Saxons: for we find the Britans settled here 228 years after the arrival of the Saxons; because at that time Egfrid king of Northumberland gave St Cuthbert the land called *Carthmell*, and all the Britans in it, as is related in his life. In these mountainous parts are found quarries of a fine durable blue slate to cover buildings with, which are made use of in many other parts of the kingdom. Here are several cotton mills lately erected; and if fuel for fire were more plentiful, the trade of this country would much increase: but there being no coals nearer than Wigan or Whitehaven, and the coast-duties high, firing is rather scarce, the country people using only turf or peat, and that begins to be more scarce than formerly. In the mosses of Fourness much fir is found, but more oak: the trunks in general lie with their heads to the east, the high winds having been from the west. High Fourness has ever had great quantities of sheep, which browse upon the hollies left in great numbers for them; and produces charcoal for melting iron-ore, and oak-bark for tanners use, in great abundance. The forests abounded with deer and wild boars, and the *legb* or *scose*, or large stags, whose horns are frequently found underground here. The low or plain part of Fourness, which is so called to distinguish it from the woody or mountainous part, produces all sorts of grain, but principally oats, whereof the bread eaten in this country is generally made; and there are found here veins of a very rich iron-ore, which is not only melted and wrought here, but great quantities are exported to other parts to mix with poorer ores. The three sands

Fourness.

Fournes
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Fowey.

above mentioned are very dangerous to travellers by the tides and the many quicksands. There is a guide on horseback appointed to Kent or Lancaster sand at 10l. *per ann.* to Leven at 6l. *per ann.* out of the public revenue; but to Dudden, which are most dangerous, none; and it is no uncommon thing for persons to pass over in parties of 100 at a time like caravans, under the direction of the carriers, who go to or fro every day. The sands are less dangerous than formerly, being more used and better known, and travellers never going without the carriers or guides. "Furnis abbey up in the mountains," was begun at Tulket in Amounderness 1124, by Stephen earl of Boulogne, afterwards king of England, for the monks of Savigni in France, and three years after removed to this valley, then called *Bekangehill*, or "the vale of nightshade." It was of the Cistercian order, endowed with above 800l. *per ann.* Out of the monks of this abbey, Mr Camden informs us, the bishops of the Isle of Man, which lies overagainst it, used to be chosen by ancient custom; it being as it were the mother of many monasteries in Man and Ireland. Some ruins, and part of the fosse which surrounded the monastery, are still to be seen at Tulket. The remains at Fournes breathe that plain simplicity of the Cistercian abbeys; the chapter-house was the only piece of elegant Gothic about it, and its roof has lately fallen in. Part of the painted glass from the east window, representing the crucifixion, &c. is preserved at Windermere church in Bowles, Westmoreland. The church (except the north side of the nave), the chapter-house, refectory, &c. remain, only unroofed.

FOURTH REDUNDANT, in music. See INTERVAL.

FOWEY, or FOY, a town of Cornwall in England, 240 miles from London, with a commodious haven on the Channel. It is a populous place, extending above one mile on the east side of a river of its own name; and has a great share in the fishing trade, especially pilchards. It rose so much formerly by naval wars and piracies, that in the reign of Edward III. its ships refusing to strike when required as they sailed by Rye and Winchelsea, were attacked by the ships of those ports, but defeated them; whereupon they bore their arms mixed with the arms of those two cinque-ports, which gave rise to the name of the "Gallants of Fowey." And we learn from Camden, that this town quartered a part of the arms of every one of the cinque-ports with their own; intimating, that they had at times triumphed over them all: and indeed once they were so powerful, that they took several of the French men of war. In the reign of Edward III. they rescued certain ships of Rye from distress, for which this town was made a member of the cinque-ports. Edward IV. favoured Fowey so much, that when the French threatened to come up the river to burn it, he caused two towers, the ruins of which are yet visible, to be built at the public charge for its security: but he was afterwards so disgusted with the inhabitants for attacking the French after a truce proclaimed with Louis XI. that he took away all their ships and naval stores, together with a chain drawn across the river between the two forts above mentioned, which was carried to Dartmouth. It is said they were so insolent, that they cut off the ears of the king's pursuivants; for which some lives were forfeited as well as estates. The corporation con-

sists of a mayor, recorder, 8 aldermen, a town-clerk, and 2 assistants. The market is Saturday, the fairs May-day and Sept. 10. Here are a fine old church, a free-school, and an hospital. The toll of the market and fairs, and keyage of the harbour, were vested in the corporation on the payment of a fee-farm rent of about 40s. It does not appear to have sent members to parliament before the 13th of Queen Elizabeth. Here is a coinage for the tin; of which a great quantity is dug in the country to the north and west of it. The river Foy, or Foath, is very broad and deep here, and was formerly navigable as high as Lestwithiel. W. Long. 5°. N. Lat. 50. 27.

FOWL, among zoologists, denotes the larger sorts of birds, whether domestic or wild: such as geese, pheasants, partridges, turkey, ducks, &c.

Tame fowl make a necessary part of the stock of a country farm. See the article POULTRY.

Fowls are again distinguished into two kinds, *viz.* land and water fowl, these last being so called from their living much in and about water: also into those which are accounted game, and those which are not. See the article GAME.

FOWLING, the art of catching birds by means of bird-lime, decoys, and other devices, or the killing of them by the gun. See BIRD-Catching, BIRD-Lime, DECOY, SHOOTING, and the names of the different birds in the order of the alphabet.

FOWLING, is also used for the pursuing and taking birds with hawks, more properly called FALCONRY or HAWKING. See these articles.

FOWLING-Piece, a light gun for shooting birds. That piece is always reckoned best which has the longest barrel, from 5½ to 6 feet, with a moderate bore; though every fowler should have them of different sizes, suitable to the game he designs to kill. The barrel should be well polished and smooth within, and the bore of an equal bigness from one end to the other; which may be proved, by putting in a piece of paste-board, cut of the exact roundness of the top: for if this goes down without stops or slipping, you may conclude the bore good. The bridge-pan must be somewhat above the touch-hole, and ought to have a notch to let down a little powder: this will prevent the piece from recoiling, which it would otherwise be apt to do. As to the locks, choose such as are well filed with true work, whose springs must be neither too strong nor too weak. The hammer ought to be well hardened, and pliable to go down to the pan with a quick motion.

FOX, in zoology. See CANIS.

The fox is a great nuisance to the husbandman, by taking away and destroying his lambs, geese, poultry, &c. The common way to catch him is by gins; which being baited, and a train made by drawing raw flesh across in his usual paths or haunts to the gin, it proves an inducement to bring him to the place of destruction.

The fox is also a beast of chase, and is taken with grehounds, harriers, &c. See the article HUNTING.

Fox (John), the martyrologist, was born at Boston in Lincolnshire in the year 1517. At the age of 16 he was entered a student of Brazen-nose college in Oxford; and in 1543 he proceeded master of arts, and was chosen fellow of Magdalen college. He discovered an early genius for poetry, and wrote several Latin comedies,

Fowl
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Fox.

Fox.

the subjects taken from scripture, which his son assures us were written in an elegant style. Forsaking the muses, he now applied himself with uncommon assiduity to the study of divinity, particularly church-history; and, discovering a premature propensity to the doctrine of reformation, he was expelled the college as an heretic. His distress on this occasion was very great; but it was not long before he found an asylum in the house of Sir Thomas Luey of Warwickshire, who employed him as a tutor to his children. Here he married the daughter of a citizen of Coventry. Sir Thomas's children being now grown up, after residing a short time with his wife's father, he came to London; where finding no immediate means of subsistence, he was reduced to the utmost degree of want; but was at length (as his son relates) miraculously relieved in the following manner: As he was one day sitting in St Paul's church, emaciated with hunger, a stranger accosted him familiarly, and, bidding him be of good cheer, put a sum of money into his hand; telling him at the same time, that in a few days new hopes were at hand. He was soon after taken into the family of the duchess of Richmond, as tutor to the earl of Surrey's children, who, when their father was sent to the tower, were committed to her care. In this family he lived, at Ryegate in Surrey, during the latter part of the reign of Henry VIII. the entire reign of Edward VI. and part of that of queen Mary: but at length, persecuted by his implacable enemy bishop Gardiner, he was obliged to seek refuge abroad. Basil in Switzerland was the place of his retreat, where he subsisted by correcting the press. On the death of queen Mary he returned to England; where he was graciously received by his former pupil the duke of Norfolk, who retained him in his family as long as he lived, and bequeathed him a pension at his death. Mr secretary Cecil also obtained for him the rectory of Shipton near Salisbury; and we are assured that he might have had considerable church-preferment, had it not been for his unwillingness to subscribe to the canons. He died in the year 1587, in the 70th year of his age; and was buried in the chancel of St Giles's, Cripplegate. He was a man of great industry, and considerable learning; a zealous, but not a violent reformer; a nonconformist, but not an enemy to the church of England. He left two sons; one of which was bred a divine, the other a physician. He wrote many pieces: but his principal work is, the Acts and Monuments of the Church, &c. commonly called *Fox's Book of Martyrs*. His facts are not always to be depended on, and he often loses his temper; which, considering the subject, is not much to be wondered at.

FOX (George), the founder of the sect of English Quakers, was a shoemaker in Nottingham. The accounts of those times tell us, that as he wrought at his trade, he used to meditate much on the scriptures: which, with his solitary course of life, improving his natural melancholy, he began at length to fancy himself inspired; and in consequence thereof set up for a preacher.

He proposed but few articles of faith; insisting chiefly on moral virtue, mutual charity, the love of God, and a deep attention to the inward motions and secret operations of the spirit: he required a plain simple worship, and a religion without ceremonies, making it

a principal point to wait in profound silence the directions of the Holy Spirit. Fox met with much rough treatment for his zeal, was often imprisoned, and several times in danger of being knocked on the head. But all discouragements notwithstanding, his sect prevailed much, and many considerable men were drawn over to them; among whom were BARCLAY and PENN. He died in 1681. His followers were called *Quakers*, in derision of some unusual shakings and convulsions with which they were seized at their first meetings. See the article *QUAKERS*.

Fox-Glove, in botany. See *DIGITALIS*.

Fox-Islands, the name of a group of islands, 16 in number, situated between the eastern coast of Kamtschatka and the western coast of the continent of America. Each island has a particular name; but the general name *Fox-islands* is given to the whole group, on account of the great number of black, grey, and red foxes with which they abound. The dress of the inhabitants consists of a cap and a fur coat, which reaches down to the knee. Some of them wear common caps of a party-coloured bird-skin, upon which they leave part of the wings and tail. On the fore-part of their hunting and fishing-caps, they place a small board like a skreen, adorned with the jaw-bones of sea-bears, and ornamented with glass-beads, which they receive in barter from the Russians. At their festivals and dancing parties they use a much more showy sort of caps. They feed upon the flesh of all sorts of sea-animals, and generally eat it raw. But if at any time they choose to dress their victuals, they make use of a hollow stone; having placed the fish or flesh therein, they cover it with another, and close the interstices with lime or clay. They then lay it horizontally upon two stones, and light a fire under it. The provision intended for keeping is dried without salt in the open air. Their weapons consist of bows, arrows, and darts; and for defence they use wooden shields.—The most perfect equality reigns among these islanders. They have neither chiefs nor superiors, neither laws nor punishments. They live together in families, and societies of several families united, which form what they call a *race*, who, in case of an attack or defence, mutually help and support each other. The inhabitants of the same island always pretend to be of the same race; and every person looks upon his island as a possession, the property of which is common to all the individuals of the same society. Feasts are very common among them, and more particularly when the inhabitants of one island are visited by those of the others. The men of the village meet their guests beating drums, and preceded by the women, who sing and dance. At the conclusion of the dance, the hosts serve up their best provisions, and invite their guests to partake of the feast. They feed their children when very young with the coarsest flesh, and for the most part raw. If an infant cries, the mother immediately carries it to the sea-side, and whether it be summer or winter, holds it naked in the water until it is quiet. This custom is so far from doing the children any harm, that it hardens them against the cold, and they accordingly go barefooted through the winter without the least inconvenience. They seldom heat their dwellings; but when they are desirous of warming themselves, they light a bundle of hay, and stand

Fox.

Fracastor,
Fraches.

over it; or else they set fire to train-oil, which they pour into a hollow stone. They have a good share of plain natural sense, but are rather slow of understanding. They seem cold and indifferent in most of their actions; but let an injury, or even a suspicion only, rouse them from this phlegmatic state, and they become inflexible and furious, taking the most violent revenge without any regard to the consequences. The least affliction prompts them to suicide; the apprehension of even an uncertain evil often leads them to despair; and they put an end to their days with great apparent insensibility.

FRACASTOR (Jerome), a most eminent Italian poet and physician, was born at Verona in the year 1482. Two singularities are related of him in his infancy: one is, that his lips adhered so closely to each other when he came into the world, that a surgeon was obliged to divide them with his incision-knife; the other, that his mother was killed with lightning, while he, though in her arms at the very moment, escaped unhurt. Fracastor was of parts so exquisite, and made so wonderful a progress in every thing he undertook, that he became eminently skilled not only in the belles lettres, but in all arts and sciences. He was a poet, a philosopher, a physician, an astronomer, a mathematician, and what not? He was a man of vast consequence in his time; as appears from pope Paul III.'s making use of his authority to remove the council of Trent to Bolougne, under the pretext of a contagious distemper, which, as Fracastor deposed, made it no longer safe to continue at Trent. He was intimately acquainted with cardinal Bembo, Julius Scaliger, and all the great men of his time. He died of an apoplexy at Casti near Verona, in 1553: and in 1559, the town of Verona erected a statue in honour of him.

He was the author of many performances, both as a poet and as a physician; yet never man was more disinterested in both these capacities than he: evidently so as a physician, for he practised without fees; and as a poet, whose usual reward is glory, nothing could be more indifferent. It is owing to this indifference, that we have so little of his poetry, in comparison of what he wrote; and that, among other compositions, his Odes and Epigrams, which were read in manuscript with infinite admiration, yet, never passing the press, were lost. What we have now of his, are the three books of "Siphilis, or of the French disease;" a book of Miscellaneous Poems; and two books of his poem, intitled, *Joseph*, which he began at the latter end of his life, but did not live to finish. And these works, it is said, would have perished with the rest, if his friends had not taken care to preserve and communicate copies of them: For Fracastor, writing merely for amusement, never troubled himself in the least about what became of his works after they once got out of his hands. Fracastor composed also a poem, called *Alcon, sive de cura canum venaticorum*. His poems as well as his other works are written all in Latin. His medical pieces are, *De Sympathia & Antipathia*,—*De contagione & contagiosis morbis*,—*De causis criticorum dierum*,—*De vini temperatura*, &c. His works have been printed separately and collectively. The best edition of them is that of Padua 1735, in 2 vols 4to.

FRACHES, in the glass trade, are the flat iron pans into which the glass vessels already formed are

put when in the tower over the working furnace, and by means of which they are drawn out through the leers, that they may be taken gradually from the fire, and cool by degrees.

FRACTION, in arithmetic and algebra, a part or division of an unit or integer; or a number which stands to an unit in the relation of a part to its whole. The word literally imports a broken number.

Fractions are usually divided into decimal, sexagesimal, and vulgar. See ALGEBRA and ARITHMETIC.

FRACTURE, in surgery, a rupture of a bone or a solution of continuity in a bone when it is crushed or broken by some external cause. See SURGERY.

FRÆNUM, or FRENUM, *Bridle*, in anatomy, a name given to divers ligaments, from their office in retaining and curbing the motions of the parts they are fitted to.

FRÆNUM Lingue, or *Bridle of the Tongue*; a membranous ligament, which ties the tongue to the os hyoides, larynx, fauces, and lower parts of the mouth. In some subjects the *frænum* runs the whole length of the tongue to the very tip; in which cases, if it were not cut, it would take away all possibility of speech. See *TONGUE-Tied*.

FRÆNUM Penis, a slender ligament, whereby the prepuce is tied to the lower part of the glans of the penis. Nature varies in the make of this part; it being so short in some, that unless divided it would not admit of perfect erection. There is also a kind of little *frænum*, fastened to the lower part of the clitoris.

FRAGA, a strong town with a handsome castle in the kingdom of Arragon in Spain. It is strong by situation among the mountains; having the river Cinca before it, whose high banks are difficult of access; and at its back a hill, which cannot easily be approached with large cannon. Alphonso VII. king of Arragon, and the first of that name of Castile, was killed by the Moors in 1134, when he besieged this town. E. Long. o. 23. N. Lat. 41. 28.

FRAGARIA, the STRAWBERRY: A genus of the polygynia order, belonging to the icosandria class of plants; and in the natural method ranking under the 35th order, *Senticose*. The calyx is decemfid; the petals five; the receptacle of the seeds ovate, in the form of a berry, and deciduous. There is but one species, viz. the vesca, or cultivated strawberry. The principal varieties are, 1. The sylvestris, or wood-strawberry, with oval sawed leaves, and small round fruit. 2. The Virginian scarlet, or Virginia strawberry, with oblong oval sawed leaves, and a roundish scarlet-coloured fruit. 3. The moschata, or hautboy, or musky strawberry, having oval, lanceolate, rough leaves, and large pale-red fruit. 4. The Chilensis, or Chili strawberry, with large, oval, thick, hairy leaves, large flowers, and very large firm fruit. 5. The Alpina, Alpine, or monthly strawberry, having small oval leaves, small flowers, and moderate-sized, oblong, pointed fruit.

All these varieties are hardy, low, perennials, durable in root, but the leaves and fruit-stalks are renewed annually in spring. They flower in May and June, and their fruit comes to perfection in June, July, and August; the Alpine kind continuing till the beginning of winter. They all prosper in any common garden soil, producing abundant crops annually with-

Fraction.
Fragaria.

Fraguer
Frame.

out much trouble. They increase exceedingly every summer, both by off-sets or suckers from the sides of the plants, and by the runners or strings, all of which rooting and forming plants at every joint, each of which separately planted bears a few fruit the following year, and bear in great perfection the second summer. Those of the Alpine kind will even bear fruit the same year that they are formed. All the forts are commonly cultivated in kitchen-gardens, in beds or borders of common earth, in rows lengthwise 15 or 18 inches distance; the plants the same distance from one another in each row. Patches of the different sorts disposed here and there in the fronts of the different compartments of the pleasure-ground, will appear ornamental both in their flowers and fruit, and make an agreeable variety.

Strawberries, eaten either alone, or with sugar and milk, are universally esteemed a most delicious fruit. They are grateful, cooling, subacid, and juicy. Though taken in large quantities, they seldom disagree. They promote perspiration, impart a violet smell to the urine, and dissolve the tartareous incrustations on the teeth. People afflicted with the gout or stone have found relief by using them very largely; and Hoffman says, he has known consumptive people cured by them. The bark of the root is astringent.—Sheep and goats eat the plant; cows are not fond of it; horses and swine refuse it.

FRAGUIER (Claude Francis), a polite and learned French writer, born at Paris, of a noble family, in 1666. He was educated under the Jesuits, and was even admitted into the order, though he afterwards quitted it; and being thus at liberty to follow his inclinations, he soon after assisted the Abbé Bignon in conducting the *Journal de Sçavans*, having all the qualifications for such a work. His works consist of Latin poems, and a great number of very excellent dissertations. He died in 1728.

FRAIL, a basket made of rushes or the like, in which are packed up figs, raisins, &c. It signifies also a certain quantity of raisins, about 75 pounds.

FRAISE, in fortification, a kind of defence, consisting of pointed stakes, six or seven feet long, driven parallel to the horizon into the retrenchments of a camp, a half-moon, or the like, to prevent any approach or scalade.

Fraises differ from palisades chiefly in this, that the latter stand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly so, being usually made a little sloping, or with the points hanging down. Fraises are chiefly used in retrenchments and other works thrown up of earth; sometimes they are found under the parapet of a rampart, serving instead of the cordon of stone used in stone-works.

To FRAISE a Battalion, is to line the musqueteers round with pikes, that in case they should be charged with a body of horse, the pikes being presented, may cover the musqueteers from the shock, and serve as a barricade.

FRAME, in joinery, a kind of case, wherein a thing is set or inclosed, or even supported; as a window-frame, a picture-frame, &c.

FRAME is also a machine used in divers arts; as,

FRAME, among printers, is the stand which supports the cases. See CASE.

FRAME, among founders, a kind of ledge inclosing a board; which, being filled with wetted sand, serves as a mould to cast their works in. See FOUNDERY.

FRAME is more particularly used for a sort of loom, whereon artificers stretch their linens, silks, stuffs, &c. to be embroidered, quilted, or the like.

FRAME, among painters, a kind of square, consisting of four long slips of wood joined together, whose intermediate space is divided by threads into several little squares like a net; and hence sometimes called *reticula*. It serves to reduce figures from great to small; or, on the contrary, to augment their size from small to great.

FRAMLINGHAM, a town of Suffex, 88 miles from London. It is a large old place, with a castle, supposed to have been built by some of the first kings of the East-Angles; the walls, yet standing, are 44 feet high, 8 thick, with 13 towers 14 feet above them, 2 of which are watch-towers. To this castle the princess, afterwards Queen Mary I. retired, when the Lady Jane Grey was her competitor for the crown. The town is pleasantly situated, though but indifferently built, upon a clay-hill, in a fruitful soil and a healthy air, near the source of the river Ore, by some called Wincknel, which runs through it to Orford. It has a spacious place for the market on Saturday; and a large stately church built all of black flint, with a steeple 100 feet high; two good almshouses; and a free-school.

FRANC. See FRANK.

FRANCE, a large kingdom of Europe, situated between 5° W. and 7° E. Long. and between 43° and 51° N. Lat. being bounded by the English channel and the Austrian Netherlands on the north; by Germany, Switzerland, Savoy, and Piedmont, in Italy, on the east; by the Mediterranean sea, and the Pyrenean mountains, which separate it from Spain, on the south; and by the bay of Biscay on the west.

The kingdom of France was originally possessed by the *Celts* or *Gauls*. They were a very warlike people, and often checked the progress of the Roman arms: nor did they yield till the time of Julius Cæsar, who totally subdued their country, and reduced it to the form of a Roman province*. The Romans continued in quiet possession of Gaul, as long as their empire retained its strength, and they were in a condition to repress the incursions of the German nations, whom even in the zenith of their power they had not been able to subdue. But in the reign of the emperor Valerian, the ancient Roman valour and discipline had begun to decline, and the same care was not taken to defend the provinces as formerly. The barbarous nations, therefore, began to make much more frequent incursions; and among the rest the *Franks*, a German nation, inhabiting the banks of the Rhine, proved particularly troublesome. Their origin is variously accounted for; but the most probable supposition is, that about the time of the emperor Gordian, the people inhabiting the banks of the lower Rhine entered into a confederacy with those who dwelt on the Weser, and both together assumed the name of *Franks* or *Freeman*. Their first irruption, we are told by Valerian, happened in the year 254, the second of Valerian's reign. At this time they were but few in number; and were repulsed by Aurelian, afterwards emperor.

Not

Frame
||
France.

First subdued by Julius Cæsar.

* See Gaul.

Invasion by the Franks.

France.

Not discouraged by this check, they returned two years after in far greater numbers; but were again defeated by Gallienus, whom Valerian had chosen for his partner in the empire. Others, however, continued to pour in from their native country in such multitudes, that Gallienus, no longer able to drive them out by force of arms, made advantageous proposals to one of their chiefs, whom he engaged to defend the frontiers against his countrymen as well as other invaders.

This expedient did not long answer the purpose. In 260 the Franks, taking advantage of the defeat and captivity of Valerian in Persia, broke into Gaul, and afterwards into Italy, committing every where dreadful ravages. Five years afterwards they invaded Spain; which they possessed, or rather plundered, for the space of 12 years: nor could they be driven out of Gaul till the year 275, when the emperor Probus not only gave them a total overthrow in that country, but pursued them into their own, where he built several forts to keep them in awe. This intimidated them so much, that nine of their kings submitted to the emperor, and promised an annual tribute.—They continued quiet till the year 287; when, in conjunction with the Saxon pirates, they plundered the coasts of Gaul, carrying off an immense booty. To revenge this insult, the emperor Maximian entered the country of the Franks the following year, where he committed such ravages that two of their kings submitted to him; and to many of the common people who chose to remain in Gaul, he allowed lands in the neighbourhood of Treves and Cambray.

The restless disposition of the Franks, however, did not allow them to remain long in quiet. About the year 293, they made themselves masters of Batavia and part of Flanders; but were entirely defeated, and forced to surrender at discretion, by Constantius the father of Constantine the Great, who transplanted them into Gaul. Their countrymen in Germany continued quiet till the year 306, when they renewed their depredations; but being overcome by Constantine the Great, two of their kings were taken prisoners, and thrown to the wild beasts in the shows exhibited on that occasion.

All these victories, however, as well as many others said to have been gained by the Romans, were not sufficient to prevent the incursions of this restless and turbulent nation; inasmuch that, in the year 355, they had made themselves masters of 40 cities in the province of Gaul. Soon after, they were totally defeated by the emperor Julian, and again by count Theodosius, father to the emperor of that name; but, in the year 388, they ravaged the province with more fury than ever, and cut off a whole Roman army that was sent against them. As the western empire was at this time in a very low state, they for some time found more interruption from other barbarians than from the Romans, till their progress was checked by Aetius.

³
Pharamond
the first
king.

When the war with Aetius broke out, the Franks were governed by one *Pharamond*, the first of their kings of whom we have any distinct account. He is supposed to have reigned from the year 417 or 418, to 428; and is thought by archbishop Usher to have been killed in the war with Aetius. By some he is

supposed to have compiled the Salic Laws, with the assistance of four sages named *Wisegeist*, *Lofgeist*, *Widegeist*, and *Solegeist*. But Valefius is of opinion that the Franks had no written laws till the time of Clovis.

Pharamond was succeeded by his son Clodio, who likewise carried on a war against the Romans. He is said to have received a terrible overthrow from Aetius near the city of Lens; notwithstanding which, he advanced to Cambray, and made himself master of that city, where for some time he took up his residence. After this he extended his conquests as far as the river Somme, and destroyed the cities of Treves and Cologne, Tournay and Amiens. He died in the year 448, and was succeeded by Merovæus.

Authors are not agreed whether the new king was ⁵Merovæus's brother, or son, or any relation at all, to Clodio. It seems probable indeed, that he was of a different family; as from him the first race of French kings were styled *Merovingian*. He was honoured and respected by his people, but did not greatly enlarge the boundaries of his kingdom. He died in 458.

Merovæus was succeeded by his son Childeric; who being no longer kept in awe by Aetius, made war on the Romans, and extended his conquests as far as the river Loire. He is said to have taken the city of Paris after a siege of five years, according to some, and of ten, according to others. The Roman power was now totally destroyed in Italy; and therefore *Clodoveus*, *Clovis*, or *Louis*, for his name is differently written, who succeeded Childeric, set himself about making an entire conquest of Gaul. Part of the province was still retained by a Roman named *Syagrius*, who probably had become sovereign of the country on the downfall of the western empire in 476. He was defeated and taken prisoner by Clovis, who afterwards caused him to be beheaded, and soon after totally reduced his dominions.

Thus was the French monarchy established by Clovis in the year 487. He now possessed all the country lying between the Rhine and the Loire; which, though a very extensive dominion, was yet considerably inferior to what it is at present.

Clovis had been educated in the Pagan religion, and continued in that profession till the 30th year of his age; notwithstanding which he allowed his subjects full liberty of conscience. Having married, however, Clotilda, daughter of the duke of Burgundy, this princess, who was a zealous Christian, used all her influence with her husband to persuade him to embrace her religion. For some time he continued to waver; but happening to gain a battle, where, being in great danger, he had invoked the god of Clotilda and the Christians, he afterwards gave such a favourable ear to the discourses of Remigius bishop of Rheims, that he soon declared himself a convert, and was baptised in the year 496. His acknowledgment of the truths of the gospel was not followed by any amendment of life: on the contrary, he employed the remainder of his life in the aggrandisement of himself and extension of his dominions by the most abominable treachery, fraud, and violence. In his attacks on Armorica he proved unsuccessful. The inhabitants of this country, which comprehended the maritime part of ancient Gaul lying between the rivers Seine and Loire, had united for their defence; and though abandoned by the Ro-

mans,

France.

⁴
Clodio.

⁶
Childeric.

⁷
French monarchy established by Clovis.

France.

mans, made a powerful defence against the barbarians who assaulted them on all sides. Clovis, finding them too powerful to be subdued by force, proposed an union with his people, which they readily accepted, and this the more easily on account of his professing the Christian religion. Thus the Christianity of Clovis in several instances proved subservient to the purposes of his ambition, and his power became gradually very formidable. The Burgundians at this time possessed all the country from the forest of Vosges to the sea of Marseilles, under Gondebaud the uncle of Clotilda; who to secure his own authority, had put to death two of his brothers, one of whom was the father of the French queen. The third brother, *Godagesil*, whom he had spared and allowed to possess the principality of Geneva, conspired with Clovis to drive him from his dominions. A war having commenced between the French and Burgundian monarchs, the latter was defeated in a battle by Godagesil, and obliged to fly to Avignon, leaving his antagonist master of the cities of Lyons and Vienna. The victor next laid siege to Avignon; but it was defended with such vigour, that Clovis at last thought proper to accept of a sum of money and an annual tribute from Gondebaud; who was likewise obliged to cede to Godagesil the city of Vienne, and several other places taken during the war.

Gondebaud no sooner found himself at liberty from his enemies, than he assembled a powerful army; with which he advanced towards Vienne, where Godagesil himself resided at that time. The place was garrisoned by 5000 Franks, and might have made considerable resistance; but Gondebaud being admitted through the subterraneous passage of an aqueduct, massacred most of the Franks, sent the rest prisoners to the king of the Visigoths, and put Godagesil to death. This was quickly followed by the submission of all the other places which had owned the authority of Godagesil: and Gondebaud, now thinking himself able to resist the power of Clovis, sent a message to inform him, that he must no longer expect the promised tribute; and though Clovis was very much mortified with this defection, he found himself obliged for the present to put up with the injury, and accept of the alliance and military service of the king of Burgundy.

His next expedition was against the Visigoths, who possessed considerable territories on both sides of the Pyrenean mountains. His motives for this undertaking were expressed in the following speech to his nobility when assembled in the city of Paris, which he considered as the capital of his dominions. "It is with concern (said the religious monarch) that I suffer the Arians to possess the most fertile part of Gaul; let us, with the aid of God, march against them; and having conquered them, annex their kingdom to our dominions." The nobility approved of the scheme; and Clovis marched against a prince for whom he had but lately professed the greatest regard, vowing to erect a church in honour of the holy apostles, if he succeeded in his enterprise. Alaric the king of the Visigoths was a young man destitute of military experience, though personally brave. He did not therefore hesitate at engaging his antagonist; but, unable to contend with the veteran troops of Clovis, his army was utterly defeated on the banks of the Clain, 10

miles south of Poitiers, in the year 507. Alaric, perceiving the ruin of his troops, rushed against Clovis in person, by whom he was killed, and the remainder of the army pursued for some time with great slaughter. After this victory the province of Aquitain submitted, and Clovis established his winter quarters at Bourdeaux. Tholouse surrendered next spring; and the royal treasures of the Visigoths were transported to Paris. Angouleme was next reduced, and the city of Arles invested. But here the victorious career of Clovis was stopped by Theodoric king of the Ostrogoths, who had overturned the dominion of Odoacer in Italy. He had married Abolsleda the sister of Clovis, but had also given his own daughter in marriage to the king of the Visigoths, and had endeavoured, as much as was in his power, to preserve a good understanding between the two sovereigns. Finding this impossible, however, and that no bounds could be set to the ambition of Clovis, he sent one of his generals with a powerful army against him; by whom the French monarch was defeated with the loss of 30,000 men. By this misfortune Clovis was obliged to raise the siege of Arles with precipitation: however, the Franks still retained the greatest part of their conquests, and the province of Aquitain was indissolubly annexed to their empire.

In 509, Clovis had the title of Roman consul; by which means the people of Rome were insensibly led to pay a peculiar regard to the French monarchs: and Clovis was now supposed to be invested with a just title to all his conquests in whatever manner they had been acquired. He was solemnly invested with his new dignity in the church of St Martin in the city of Tours; after which he entered the cathedral clothed in a purple tunic and mantle, the badges of his office.

Clovis now proceeded to augment his power by the murder of his kinsmen the princes of the Merovingian race. Among those who perished on this occasion were Sigibert king of Cologne, with his son Cloderic, Cararic, another prince whose dominions have not been accurately pointed out by historians; Ranacaire, who governed the present diocese of Cambray; and Renomer king of the territory of Maine. All these murders, however, were expiated, according to the views of the clergy of those times, by the great zeal he expressed in the cause of Christianity, and his liberality to the church.

Clovis died in the year 511, after having reformed and published the Salic laws: a few lines of which, debarring women from inheriting any part of the Salic lands, have been extended so far as to deprive the females of the royal family of France of their right of succession to the throne of that kingdom.

Clovis was buried in the church of St Peter and St Paul, now Genevieve, in the city of Paris, where his tomb is still to be seen. His dominions were divided among his four sons. Thieri, or Theodoric, the eldest, had the eastern part of the empire; and, from his making the city of Metz his capital, is commonly called the *king of Metz*. Clodomir, the eldest son by Clotilda, had the kingdom of Orleans; Childebert, and Clotaire, who were both infants, had the kingdoms of Paris and Soissons, under the tutelage of their mother. The prudence of Clotilda kept matters quiet in all the parts of the empire for eight years; but about

France.

8

is honoured with the title of Roman Consul.

9

His dominions were divided among his children.

France.

about the year 520, a numerous fleet of Danes arrived at the mouth of the Meuse; and their king Cochiliac, having landed his forces, began to destroy the country with fire and sword. Against him Thieri sent his son Theodobert, who defeated the Danish army and navy, and killed their king, forcing the rest to retire with precipitation.

In 522, Hermanfroi king of Thuringia, having destroyed one of his brethren named *Berthaire*, and seized on his dominions, applied to Thieri for assistance against his other brother Balderic, whom he intended to treat in the same manner. In this infamous enterprise Thieri embarked, on condition that he should have one half of Balderic's dominions; but after the unhappy prince was overcome and killed in battle, Hermanfroi seized all his dominions. Thieri had no opportunity of revenging himself till the year 531; when perceiving the power of the Ostrogoths, whom he much dreaded, to be considerably lessened by the death of king Theodric, he engaged his brother Clotaire to assist him; and they accordingly entered Thuringia with two powerful armies. They joined their forces as soon as they had passed the Rhine, and were quickly after reinforced by a considerable body of troops under the command of Theodobert. The allies attacked the army of Hermanfroi, which was advantageously posted; and having totally defeated it, he was forced to fly from place to place in disguise. Soon after this the capital was taken, and Hermanfroi himself being invited to a conference by Thieri, was treacherously murdered; after which his extensive dominions became feudatory to Thieri.

In the mean time, Clotilda had excited her children to make war on the Burgundians, in order to revenge the death of her father Chilperic, whom Gondebaud king of Burgundy had caused to be murdered. Gondebaud was now dead, and had left his dominions to his sons Sigismund and Godemar. Sigismund's forces were quickly defeated; and he himself was soon after delivered up by his own subjects to Clodomir, who caused him to be thrown into a pit, where he perished miserably. By his death Godemar became master of Burgundy. Clodomir marched against him, and defeated him; but pursuing his victory too eagerly, was surrounded by his enemies and slain. After the reduction of Thuringia, however, Childebert and Clotaire entered the kingdom of Burgundy at the head of a powerful army, and in 534 completed the conquest of it; in which, according to some, Godemar was killed; according to others, he retired into Spain, and from thence into Africa.

In
Clotaire becomes sole monarch.

In 560 Clotaire became sole monarch of France. He had murdered the sons of Clodomir, who was killed in Burgundy as above related. Thieri and his children were dead, as was also Childebert; so that Clotaire was sole heir to all the dominions of Clovis. He had five sons; and the eldest of them, named *Chramnes*, had some time before rebelled against his father in Auvergne. As long as Childebert lived, he supported the young prince; but on his death, Chramnes was obliged to implore his father's clemency. He was at this time pardoned; but he soon began to cabal afresh, and engaged the count of Bretagne to assist him in another rebellion. The Bretons, however, were defeated, and Chramnes determined to make his escape; but perceiving

N^o 130.

that his wife and children were surrounded by his father's troops, he attempted to rescue them. In this attempt he was taken prisoner, and with his family was thrust into a thatched cottage near the field of battle; of which the king was no sooner informed, than he commanded the cottage to be set on fire, and all that were in it perished in the flames.

Clotaire did not long survive this cruel execution of his son, but died in 562; and after his death the French empire was divided among his four remaining sons, Caribert, Gontran, Sigebert, and Chilperic. The old king made no division of his dominions before he died, which perhaps caused the young princes to fall out sooner than they would otherwise have done. After his death, however, they divided the kingdom by lot; when Caribert, the eldest, had the kingdom of Paris; Gontran, the second, had Orleans; Sigibert had Metz (or the kingdom of Austrasia); and Chilperic had Soissons. Provence and Aquitaine were possessed by all of them in common. The peace of the empire was first disturbed in 563 by an invasion of the Abares; a barbarous nation, said to be the remains of the Huns. They entered Thuringia, which belonged to the dominions of Sigebert; but by him they were totally defeated, and obliged to repass the Elbe with precipitation. Sigebert pursued them close, but readily concluded a peace with them on their first proposals. To this he was induced, by hearing that his brother Chilperic had invaded his dominions, and taken Rheims and some other places in the neighbourhood. Against him, therefore, Sigebert marched with his victorious army, made himself master of Soissons his capital, and of the person of his eldest son Theodobert. He then defeated Chilperic in battle; and not only recovered the place which he had seized, but conquered the greater part of his dominions: nevertheless, on the mediation of the other two brothers, Sigebert abandoned all his conquests, set Theodobert at liberty, and thus restored peace to the empire.

Soon after this, Sigebert married Brunehaut daughter to Athanagilde king of the Visigoths in Spain; and in a little time after the marriage, died Caribert king of Paris, whose dominions were divided among his three brethren. In 567 Chilperic married Galswintha, Brunehaut's eldest sister, whom he did not obtain without some difficulty. Before her arrival, he dismissed his mistress called *Fredegonde*; a woman of great abilities and firmness of mind, but ambitious to the highest degree, and capable of committing the blackest crimes in order to gratify her ambition. The queen, who brought with her immense treasures from Spain, and made it her whole study to please the king, was for some time entirely acceptable. By degrees, however, Chilperic suffered Fredegonde to appear again at court, and was suspected of having renewed his intercourse with her; which gave such umbrage to the queen, that she desired leave to return to her own country, promising to leave behind her all the wealth she had brought. The king, knowing that this would render him extremely odious, found means to dissipate his wife's suspicions, and soon after caused her to be privately strangled, upon which he publicly married Fredegonde.

Such an atrocious action could not fail of exciting the greatest indignation against Chilperic. His domi-

France.

II
The empire again divided.

12
Infamous conduct of Chilperic.

France. nions were immediately invaded by Sigebert and Gontran, who conquered the greatest part of them; after which they suddenly made peace, Chilperic consenting that Brunehaut should enjoy those places which on his marriage he had bestowed upon Galswintha, viz. Bourdeaux, Limoges, Cahors, Bigorre, and the town of Bearn, now called *Lescar*.

The French princes, however, did not long continue at peace among themselves. A war quickly ensued, in which Gontran and Chilperic allied themselves against Sigebert. The latter prevailed; and having forced Gontran to a separate peace, seemed determined to make Chilperic pay dear for his repeated perfidy and infamous conduct; when he was assassinated by a contrivance of Fredegonde, who thus saved herself and Chilperic from the most imminent danger. Immediately on his death, Brunehaut fell into the hands of Chilperic; but Gondebaud, one of Sigebert's best generals, made his escape into Austrasia with Childebert, the only son of Sigebert, an infant of about five years of age, who was immediately proclaimed king in room of his father. In a short time, however, Meroveus, eldest son to Chilperic, fell in love with Brunehaut, and married her without acquainting his father. Chilperic, on this news, immediately went to Rouen, where Meroveus and his consort were; and having seized them, sent Brunehaut and her two daughters to Metz, and carried Meroveus to Soissons. Soon after, one of his generals being defeated by Gontran, who espoused Brunehaut's cause, Chilperic, in a fit of rage, caused Meroveus to be shaved and confined in a monastery. From hence he found means to make his escape, and with great difficulty arrived in Austrasia, where Brunehaut would gladly have protected him: but the jealousy of the nobles was so strong, that he was forced to leave that country; and being betrayed into the hands of his father's forces, was murdered at the instigation of Fredegonde, as was generally believed.

The French empire was at this time divided between Gontran king of Orleans, called also king of Burgundy, Chilperic king of Soissons, and Childebert king of Austrasia. Chilperic found his affairs in a very disagreeable situation. In 579, he had a dispute with Varoc count of Bretagne, who refused to do him homage. Chilperic dispatched a body of troops against him; who were defeated, and he was then forced to submit to a dishonourable peace. His brother and nephew lived in strict union, and had no reason to be very well pleased with him. His own subjects, being oppressed with heavy taxes, were miserably poor and discontented. His son Clovis, by a former queen named *Andovera*, hated Fredegonde, and made no secret of his aversion. To add to his embarrassment, the seasons were for a long time so unfavourable, that the country was threatened with famine and pestilence at the same time. The king and queen were both attacked by an epidemic disease which then raged. They recovered: but their three sons, Clodobert, Samson, and Dagobert, died; after which, the sight of Clovis became so disagreeable to Fredegonde, that she caused him to be murdered, and likewise his mother *Andovera*, lest Chilperic's affection for her should return after the tragical death of her son.

In 583 Chilperic himself was murdered by some unknown assassins, when his dominions were on the point

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of being conquered by Gontran and Childebert, who had entered into a league for that purpose. After his death Fredegonde implored the protection of Gontran for herself and her infant son Clotaire; which he very readily granted, and obliged Childebert to put an end to the war. He found himself, however, greatly difficult to keep Fredegonde and Brunehaut in awe; for these two princesses having been long rivals and implacable enemies, were continually plotting the destruction of each other. This, however, he accomplished, by favouring sometimes Brunehaut and sometimes Fredegonde; so that, during his life, neither of them durst undertake any thing against the other.

On the 28th of March 593, died Gontran, having lived upwards of 60, and reigned 32 years. Childebert succeeded to the kingdom without opposition, but did not long enjoy it; he himself dying in the year 596, and his queen shortly after. His dominions were divided between his two sons Theodobert and Thierry; the first of whom was declared king of Austrasia, and the latter king of Burgundy. As Theodobert was only in the 11th year of his age, and Thierry in his 10th, Brunehaut governed both kingdoms with an absolute sway. Fredegonde, however, took care not to let slip such a favourable opportunity as was offered her by the death of Childebert, and therefore made herself mistress of Paris and some other places on the Seine. Upon this Brunehaut sent against her the best part of the forces in Austrasia, who were totally defeated; but Fredegonde died before she had time to improve her victory, leaving her son Clotaire heir to all her dominions.

For some time Brunehaut preserved her kingdom in peace; but in the end her own ambition proved her ruin. Instead of instructing Theodobert in what was necessary for a prince to know, she took care rather to keep him in ignorance, and even suffered him to marry a young and handsome slave of his father's. The new queen was possessed of a great deal of affability and good-nature; by which means she in a short time gained the affection of her husband so much, that he readily consented to the banishment of Brunehaut. Upon this disgrace she fled to Thierry king of Burgundy, in the year 599. By him she was very kindly received; and instead of exciting jealousies or misunderstandings between the two brothers, she engaged Thierry to attempt the recovery of Paris and the other places which had been wrested from their family by Fredegonde, procuring at the same time a considerable body of auxiliaries from the Visigoths. This measure was so acceptable to Theodobert, that he likewise raised a numerous army, and invaded Clotaire's dominions in conjunction with his brother. A battle ensued, in which the forces of Clotaire were totally defeated, and himself obliged soon after to sue for peace; which was not granted, but on condition of his yielding up the best part of his dominions.

This treaty was concluded in the year 600; but three years afterwards, it was broken by Clotaire. He was again attacked by the two brothers, and the war carried on with great vigour till the next spring. At this time Thierry having forced Landri, Clotaire's general, to a battle, gave him a total overthrow, in which the king's infant son Meroveus, whom he had sent along with Landri, was massacred; to gratify, as Clotaire

France.

taire pretended, the malice of Brunehaut. After this victory, Thierry marched directly to Paris; fully bent on the destruction of his cousin, which now seemed inevitable. This, however, was prevented by Theodobert; who no sooner heard of the victory gained by Thierry, than he became jealous of his success, and offered Clotaire such terms of peace as he gladly accepted. The latter having then nothing to fear on the side of Austrasia, quickly compelled Thierry to listen to terms of accommodation also.

This behaviour of Theodobert greatly provoked his brother; and his resentment was highly inflamed by Brunehaut, who never forgot her disgrace in being banished from his court. A war was therefore commenced between the two brothers in 605; but it was so highly disapproved of by the nobility, that Thierry found himself obliged to put an end to it. The tranquillity which now took place was again disturbed in 607, by Theodobert's sending an embassy to demand some part of Childebert's dominions which had been added, by the will of that monarch, to those of Burgundy. The nobility of both kingdoms were so much averse to war, that they constrained their kings to consent to a conference, attended by an equal number of troops; but Theodobert, by a scandalous breach of his faith, brought double the number, and compelled his brother to submit to what terms he pleased. This piece of treachery instantly brought on a war; for Thierry was bent on revenge, and his nobility no longer opposed him. It was necessary, however, to secure Clotaire by a negotiation; and accordingly a promise was made of restoring those parts of his dominions which had formerly been taken from him, provided he would remain quiet. This treaty being finished, Thierry entered Theodobert's dominions, defeated him in two battles, took him prisoner, used him with the utmost indignity; and having caused an infant son of his to be put to death, sent him to his grandmother Brunehaut. By her orders he was first shaved and confined in a monastery; but afterwards, fearing lest he should make his escape, she caused him to be put to death. Clotaire, in the mean time, thought that the best method of making Thierry keep his word was to seize on those places which he had promised to restore to him, before his return from the war with Theodobert. This he accordingly did; and Thierry no sooner heard of his having done so, than he sent him a message requiring him to withdraw his forces, and, in case of his refusal, declared war. Clotaire was prepared for this; and accordingly assembled all the forces in his dominions, in order to give him a proper reception. But before Thierry could reach his enemies, he was seized with a dysentery; of which he died in the year 612, having lived 26 years, and reigned 17.

On the death of Thierry, Brunehaut immediately caused his eldest son, named *Sigisbert*, then in the 10th year of his age, to be proclaimed king. It is probable that she intended to have governed in his name with an absolute sway; but Clotaire did not give her time to discover her intentions. Having great intelligence in Austrasia and Burgundy, and knowing that the nobility in both kingdoms were disaffected to Brunehaut, he declared war against her; and she being betrayed by her generals, fell into the hands of her enemies. Clotaire gave her up to the nobles; who generally

hated her, and who used her in the most cruel manner. After having led her about the camp, exposed to the insults of all who had the means to insult her, she was tied by the leg and arm to the tail of an untamed horse, which, setting off at full speed, quickly dashed out her brains. After this her mangled body was reduced to ashes, which were afterwards interred in the abbey of St Martin at Autun.

Thus in the year 613, Clotaire became sole monarch of France; and quietly enjoyed his kingdom till his death, which happened in 628. He was succeeded by Dagobert; who proved a great and powerful prince, and raised the kingdom of France to a high degree of splendor. Dagobert was succeeded by his sons Sigebert and Clovis; the former of whom had the kingdom of Austrasia, and the latter that of Burgundy. Both the kings were minors at the time of their accession to the throne, which gave an opportunity to the mayors of the palace (the highest officers under the crown) to usurp the whole authority. Sigebert died in 640, after a short reign of one year; leaving behind him an infant son named *Dagobert*, whom he strongly recommended to the care of Grimoalde his mayor of the palace. The minister caused Dagobert to be immediately proclaimed king, but did not long suffer him to enjoy that honour. He had not the cruelty, however, to put him to death; but sent him to a monastery in one of the Western islands of Scotland; and then, giving out that he was dead, advanced his own son Childebert to the throne. Childebert was expelled by Clovis king of Burgundy; who placed on the throne Childeric, the second son of Sigebert. Clovis died soon after the revolution, and was succeeded in his dominions by his son Clotaire; who died in a short time, without issue. He was succeeded by his brother Childeric; who, after a short reign, was murdered with his queen, at that time big with child, and an infant son named *Dagobert*; though another, named *Daniel*, had the good luck to escape.

The affairs of the French were now in the most deplorable situation. The princes of the Merovingian race had been for some time entirely deprived of their power by their officers called *mayors of the palace*. In Austrasia the administration had been totally engrossed by Pepin and his son Grimoalde; while Archambaud and Ebroin did the same in Neustria and Burgundy. On the reunion of Neustria and Burgundy to the rest of the French dominions, this minister ruled with such a despotic sway, that the nobility of Austrasia were provoked to a revolt; electing for their dukes two chiefs named *Martin* and *Pepin*. The forces of the confederates, however, were defeated by Ebroin; and Martin having surrendered on a promise of safety, was treacherously put to death. Pepin lost no time in recruiting his shattered forces; but before he had any occasion to try his fortune a second time in the field of battle, the assassination of Ebroin delivered him from all apprehensions from that quarter. After his death Pepin carried every thing before him, overthrew the royal army under the command of the new minister Bertaire; and, having got possession of the capital, caused himself to be declared mayor of the palace; in which station he continued to govern with an absolute sway during the remainder of his life.

Pepin (who had got the surname of *Herissal* from his

France.

19
Brunehaut
put to a
cruel death

18
Death of
Thierry.

20.
Miserable
situation of
France.

France.

his palace on the Meuse) died in the year 714, having enjoyed unlimited power for 26 years. He appointed his grandson Theudobalde, then only six years of age, to succeed him in his post of mayor of the palace. This happened during the reign of Dagobert already mentioned; but this prince had too much spirit to suffer himself to be deprived of his authority by an infant. The adherents of the young mayor were defeated in battle, and this defeat was soon followed by his death.

21
Exploits of
Charles
Martel.

Charles, however, the illegitimate son of Pepin, was now raised to the dignity of duke by the Austrasians, and by his great qualities seemed every way worthy of that honour. The murder of Dagobert freed him from a powerful opponent; and the young king Chilperic, who after Dagobert's death was brought from a cloyster to the throne, could by no means cope with such an experienced antagonist. On the 19th of March 717, Charles had the good fortune to surprise the royal camp as he passed through the forest of Arden; and soon after a battle ensued, in which the king's forces were entirely defeated. On this Chilperic entered into an alliance with Eudes duke of Aquitaine, whose friendship he purchased by the final cession of all the country which Eudes had seized for himself. Charles, however, having placed on the throne another of the royal family named Clotaire, advanced against Chilperic and his associate, whom he entirely defeated near Soissons. After this disaster, Eudes, despairing of success, delivered up Chilperic into the hands of his antagonist; after having stipulated for himself the same terms which had been formerly granted him by the captive monarch.

Charles now advanced to the summit of power, treated Chilperic with great respect; and, on the death of Clotaire, caused him to be proclaimed king of Austrasia; by which, however, his own power was not in the least diminished: and from this time the authority of the kings of France became merely nominal; and so inactive and indolent were they accounted, that historians have bestowed upon them the epithet of *saincans*, i. e. "lazy or idle." Charles, however, had still one competitor to contend with. This was Rainfroy, who had been appointed mayor of the palace; and who made such a vigorous resistance, that Charles was obliged to allow him the peaceable possession of the country of Anjou. No sooner, however, had Charles thus set himself at liberty from domestic enemies, than he was threatened with destruction from foreign nations. The Suevians, Frisons, and Alemanni, were successively encountered and defeated. Eudes also, who had perfidiously broken the treaties to which he had bound himself, was twice repulsed; after which Charles invaded Aquitaine, and obliged the treacherous duke to hearken to reason. This was scarce accomplished, when he found himself engaged with a more formidable enemy than any he had yet encountered. The Saracens, having over-run great part of Asia, now turned their victorious arms westward, and threatened Europe with total subjection. Spain had already received the yoke; and having passed the Pyrenees, they next invaded France, appearing in vast numbers under the walls of Thoulouse. Here they were encountered and defeated by Eudes; but this proved only a partial check. The barbarians once more passing the Pyrenees, entered France with such a powerful army, that Eudes was no longer able

to resist. He encountered them indeed with his accustomed valour; but being forced to yield to superior power, he solicited the protection and assistance of Charles. On this occasion the latter, on account of his valour and personal strength, acquired the name of *Martel*, i. e. "the hammer," alluding to the violence of the strokes he bestowed on his enemies*. Three hundred and seventy-five thousand of the Infidels, among whom was the commander Abderahman himself, are said to have perished in the battle; notwithstanding which they soon made another irruption; but in this they were attended with no better success, being again defeated by Charles; who by so many victories established his power on the most solid foundation. Having again defeated the Frisons, and with his own hand killed their duke, he assumed the sovereignty of the dominions of Eudes after his decease, reserving to himself the claim of homage, which he ought to have yielded to Thierry his lawful sovereign. At last his fame grew so great, that he was chosen by pope Gregory III. for his protector. He offered to shake off the yoke of the Greek emperor, and to invest Charles with the dignity of Roman consul; sending him at the same time the keys of the tomb of St Peter; but while this negotiation was going on successfully, the pope, the emperor, and Charles Martel himself died. After his death, which happened in the year 741, his dominions were divided among his three sons, Carloman, Pepin, and Grippon, according to the disposition he had made in his life-time. By this Carloman, the eldest, had Austrasia; Pepin, the second, Neustria and Burgundy; while Grippon, the third, had only some lands assigned him in France; by which he was so much displeased, that the tranquillity of the empire was soon disturbed. With the assistance of his mother Sonnechilde he seized on the city of Laon, where he endured a violent siege. In the end, however, he was obliged to submit; Sonnechilde was put into a monastery, and Grippon imprisoned in a castle at Arden. The two brothers, having thus freed themselves from their domestic enemy, continued to govern the empire with uninterrupted harmony; but their tranquillity was soon disturbed by the intrigues of Sonnechilde. That enterprising and ambitious woman had negotiated a marriage between Odilon duke of Bavaria and Hiltrude the sister of the two princes. This was no sooner accomplished than Odilon, instigated by Sonnechilde, and alarmed at the growing power of the two princes, entered into an alliance with Theudobald duke of the Alemanni and Theodoric duke of the Saxons; who having assembled a formidable army, advanced directly against the princes. They posted themselves in an advantageous manner, with the river Lech in their front; but Carloman and Pepin, passing the river at different fords in the night-time, attacked the camp of the allies with great vigour. The engagement continued doubtful for five hours; but at last the entrenchments were forced on all sides, the Bavarians and Saxons entirely routed, and the vanquished dukes obliged to submit to the clemency of the victors. During their absence on this expedition, Hunalde, whom Charles Martel had appointed duke of Aquitaine, having likewise entered into a confederacy with Odilon, passed the Loire, ravaged the open country, and burnt the magnificent cathedral of the city of Chartres. The two princes, however, having returned with their vic-

France.

* See *Ara-*
biz, n^o 174.

22
France di-
vided a-
mong the
sons of
Charles.

France.

torious army, Hunalde found himself obliged to retreat : and even this availed him but little ; for the Franks entering the duchy of Aquitain, committed such devastations, that Hunalde in despair resigned his dominions to his son, and retired into a convent. This event was soon followed by a similar resignation of Carloman, notwithstanding the uninterrupted success he had met with. He suddenly took the resolution of retiring into a convent, and persisted in his design, notwithstanding the intreaties of Pepin, who, to appearance at least, did all he could to dissuade him.

23
Pepin becomes sole master of the kingdom.

By the resignation of Carloman, which happened in the year 746, Pepin was left sole master of France ; and in this exalted station he acquitted himself in such a manner as has justly rendered his name famous to posterity. One of the first acts of his new administration was to release his brother Grippon from prison : but that treacherous prince had no sooner regained his liberty, than he again excited the Saxons to take up arms. His enterprise, however, proved unsuccessful ; the Saxons were defeated, their duke Theodoric taken, and his subjects obliged to submit to the will of the conqueror ; who upon this occasion caused them make a profession of the Christian religion. Grippon then fled to Hiltrude, his half-sister, whose husband Odilon was now dead, and had left an infant son named *Tassilon*. He met with a favourable reception from her ; but, with his usual treachery, seized both her and her son by the assistance of an army of malcontent Franks, whom he had persuaded to join him. His next step was to assume the sovereignty and title of duke of Bavaria ; but being driven from the throne by Pepin, he was obliged to implore his clemency, which was once more granted. All these misfortunes, however, were not yet sufficient to cure Grippon of his turbulence and ambition : He once more endeavoured to excite disturbances in the court of Pepin ; but being finally detected and baffled, he was obliged to take refuge in Aquitain.

24
Assumes the title of king.

Pepin having now subdued all his foes both foreign and domestic, began to think of assuming the title of *king*, after having so long enjoyed the regal power. His wishes in this respect were quite agreeable to those of the nation in general. The nobility, however, were bound by an oath of allegiance to Childeric the nominal monarch at that time ; and this oath could not be dispensed with but by the authority of the pope. Ambassadors for this purpose were therefore dispatched both from Pepin and the nobility to pope Zachary, the reigning pontiff. His holiness replied, that it was lawful to transfer the regal dignity from hands incapable of maintaining it to those who had so successfully preserved it ; and that the nation might unite in the same person the authority and title of *king*. On this the unfortunate Childeric was degraded from his dignity, shaved, and confined in a monastery for life ; Pepin assumed the title of *king of France*, and the line of Clovis was finally set aside.

This revolution took place in the year 751. The attention of the new monarch was first claimed by a revolt of the Saxons ; but they were soon reduced to subjection, and obliged to pay an additional tribute : and during his expedition against them, the king had the satisfaction of getting rid of his restless and treacherous competitor Grippon. This turbulent prince,

having soon become weary of residing at the court of Aquitain, determined to escape from thence, and put himself under the protection of Astolphus king of the Lombards ; but he was killed in attempting to force a pass on the confines of Italy. Pepin in the mean time continued to push his good fortune. The submission of the Saxons was soon followed by the reduction of Brittany ; and that by the recovery of Narbonne from the Infidels. His next exploit was the protection of pope Stephen III. against Astolphus the king of the Lombards, who had seized on the exarchate of Ravenna, and insisted on being acknowledged king of Rome. The pope, unable to contend with such a powerful rival, halted to cross the Alps and implore the protection of Pepin, who received him with all the respect due to his character. He was lodged in the abbey of St Dennis, and attended by the king in person during a dangerous sickness with which he was seized. On his recovery Stephen solemnly placed the diadem on the head of his benefactor, bestowed the regal unction on his sons Charles and Carloman, and conferred on the three princes the title of *patrician of Rome*. In return for these honours Pepin accompanied the pontiff into Italy at the head of a powerful army. Astolphus, unable to withstand such a powerful antagonist, shut himself up in Pavia, where he was closely besieged by the Franks, and obliged to renounce all pretensions to the sovereignty of Rome, as well as to restore the city and exarchate of Ravenna, and swear to the observance of the treaty. No sooner was Pepin gone, however, than Astolphus broke the treaty he had just ratified with such solemnity. The pope was again reduced to distress, and again applied to Pepin. He now sent him a pompous epistle in the style and character of St Peter himself ; which so much inflamed the zeal of Pepin, that he instantly set out for Italy, and compelled Astolphus a second time to submit to his terms, which were now rendered more severe by the imposition of an annual tribute. Pepin next made a tour to Rome ; but finding that his presence there gave great uneasiness both to the Greeks and to the pope himself, he thought proper to finish his visit in a short time. Soon after his return Astolphus died, and his dominions were usurped by his general Didier ; who, however, obtained the papal sanction for what he had done, and was recognised as lawful sovereign of the Lombards in the year 756.

Pepin returned to France in triumph ; but the peace of his dominions was soon disturbed by the revolt of the Saxons, who always bore the French yoke with the utmost impatience. Their present attempts, however, proved equally unsuccessful with those they had formerly made ; being obliged to submit and purchase their pardon not only by a renewal of their tribute, but by an additional supply of 300 horse. But while the king was absent on this expedition, Vaisar duke of Aquitain took the opportunity of ravaging Burgundy, where he carried his devastations as far as Chalons. Pepin soon returned, and entering the dominions of Vaisar, committed similar devastations, and would probably have reduced the whole territory of Aquitain, had he not been interrupted by the hostile preparations of his nephew Tassilon the duke of Bavaria. The king, however, contented himself at present with securing his frontiers by a chain of posts, against any

France.

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France.

France.

invasion; after which he resumed his enterprise on the dominions of Vaisar. The latter at first attempted to impede the progress of his antagonist by burning and laying waste the country; but finding this to no purpose, he determined to try his fortune in an engagement. Victory declared in favour of Pepin; but he refused to grant a peace upon any terms. The French monarch advanced to the banks of the Garonne; while Vaisar was abandoned by his ally the duke of Bavaria, and even by his own subjects. In this distress he retired with a band of faithful followers into the country of Saintonge, where he defended himself as long as possible, but was at last deprived both of his crown and life by the victor.

Thus the duchy of Aquitain was once more annexed to the crown of France; but Pepin had scarce time to indulge himself with a view of his new conquest when he was seized with a slow fever, which put an end to his life in the year 768, the 54th of his age, and 17th of his reign. He was of a short stature, whence he had the surname of *Le Bref*, or *the Short*; but his great actions justly intitled him to the character of an hero; though under the succeeding reign his own fame seemed to have been entirely forgot, and on his tomb was only inscribed, "Here lies the father of Charlemagne."

25
Death of
Pepin.

26
Succeeded
by his two
sons.

Pepin was succeeded in his authority by his two sons Charles and Carloman; to whom with his dying breath he bequeathed his dominions. They continued to reign jointly for some time; but the active and enterprising spirit of Charles gave such umbrage to the weak and jealous Carloman, that he regarded him with envy, and was on the point of coming to an open rupture with him, when he himself was taken off by death, and thus the tranquillity of the empire was preserved.

The first military enterprise of Charles was against Hunalde, the old duke of Aquitain; who leaving the monastery where he had resided upwards of 20 years, assumed the royal title, and was joyfully received by his subjects, already weary of the French yoke. Charles took the field with the utmost expedition, and with difficulty prevailed upon his brother Carloman, who was then alive, to join him with his forces. But the junction was scarce effected, when Carloman withdrew his forces again, and left his brother to carry on the war in the best manner he could. Charles, though thus deserted, did not hesitate at engaging the enemy; and having overthrown them in a great battle, Hunalde was obliged to fly to the territories of Lupus duke of Gascony. Charles quickly sent an embassy demanding the fugitive prince; and Lupus, not daring to disobey the orders of such a powerful monarch, yielded up the unfortunate Hunalde, who was instantly cast into prison, from which, however, he afterwards made his escape.

27
Reign of
Charles the
Great.

The death of Carloman, which happened in the year 771, left Charles sole master of France; but the revolt of the Saxons involved him in a series of wars from which he did not extricate himself for 33 years. These had long been tributaries to the French, but frequently revolted; and now, when freed from the terror of Pepin's arms, thought they had a right to shake off the yoke altogether. Charles entered their country with a powerful army; and having defeated them in a num-

ber of small engagements, advanced towards Eresbourg near Paderborn, where they had their capital post, and where was the image of their god Irminful, represented as a man completely armed, and standing on a column. The Saxons made an obstinate defence, but were at last obliged to submit; and Charles employed his army three days in demolishing the monuments of idolatry in this place; which so much disheartened the whole nation, that for the present they submitted to such terms as he pleased to impose; and which were rendered easier than they probably would have been, by the news which Charles now received from Italy. He had concluded a marriage with the daughter of Didier king of the Lombards; but this had been dissolved by the Pope, who reproached the Lombards with the first stain of the leprosy. Thus all friendship was dissolved betwixt Didier and Charles; and as the Lombard monarchs seem to have had a kind of natural enmity towards the popes, it is not surprising that it should now break out with uncommon fury. Didier having seized and frightened to death Pope Stephen IV. used his utmost endeavours to reduce his successor Adrian I. to a state of entire dependance on himself. Adrian applied to the French monarch, the usual resource of the pontiffs in those days. Charles was very willing to grant the necessary assistance, but the nobility were averse to an Italian war; so that he was obliged to act with great circumspection. Several embassies were therefore sent to Didier, entreating him to restore to the pope those places which he had taken from him, and at last even offering him a large sum of money if he would do so; but this proposal being rejected, he obtained the consent of his nobility to make war on the Lombards. Didier disposed his troops in such a manner, that the officers of Charles are said to have been unanimously of opinion that it would be impossible to force a passage. This, however, was accomplished, either through the superior skill of Charles, according to some historians, or a panic which seized the Lombard soldiers, according to others; after which, Didier, with the old duke of Aquitain, who had escaped from his prison, and taken refuge at his court, shut themselves up in Pavia. Adalgise, the only son of the Lombard monarch, with the widow and children of Carloman, fled to Verona. That city was immediately invested by the conqueror, and in a short time obliged to submit. Adalgise had the good luck to escape to Constantinople, but we are not informed what became of Carloman's widow and children. Charles, after paying a short visit to Rome, returned to the siege of Pavia. The place was vigorously defended, until famine and pestilence obliged the inhabitants to implore the clemency of Charles. Hunalde fell a sacrifice to his own obstinacy in opposing the intention of the people; Didier was taken prisoner and carried into France; but we are not informed of his fate afterwards. His kingdom, however, was totally dissolved, and Charles was crowned king of Lombardy at Milan in the year 774.

Having received the oaths of allegiance from his new subjects, Charles set out for Saxony, the inhabitants of which had again revolted, and recovered Eresbourg their capital. The king soon recovered this important post; but a detachment of his army being cut off, and new troubles arising in Italy, he was obliged.

ged.

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ged to accept of the proposals of the Saxons, though their sincerity was very doubtful. Having therefore only strengthened the fortifications of Eresbourg, and left a sufficient garrison in the place, he set out for Italy, which was all in commotion through the intrigues of the emperor of the East, and Adalgise the son of Didier. The presence of Charles restored tranquillity in that quarter; but in the mean time, the Saxons having taken Eresbourg and destroyed the fortifications, threatened to annihilate the French power in that quarter. On the king's return, he found them employed in the siege of Siegbourg. His sudden arrival struck the barbarians with such terror, that they instantly sued for peace; which the king once more granted, but took care to secure their obedience by a chain of forts along the river Lippe, and repairing the fortifications of Eresbourg. An assembly of the Saxon chiefs was held at Paderborn; and a promise was made, that the nation should embrace the Christian religion: after which the king set out on an expedition to Spain in the year 778.

This new enterprise was undertaken at the request of Ibanala, the Moorish sovereign of Saragossa, who had been driven from his territory. He was restored, however, by the prowess of Charles, who reduced the cities of Pampluna and Saragossa. He reduced also the city of Barcelona, and the kingdoms of Navarre and Arragon; but on his return, he met with a severe check from the Gascons, who attacked and defeated the rear-guard of his army with great slaughter as they passed the Pyrenean mountains. This engagement, which seems to imply some defect in the prudence or military skill of Charles, has been much celebrated among romance writers, on account of the death of Roland a famous warrior.

Next year, 779, he paid a visit to Italy with his two sons Carloman and Louis. Having passed the winter at Pavia, he entered Rome next spring amidst the acclamations of the inhabitants. Here, in the 39th year of his age, he divided his dominions in presence of the pope betwixt his two sons Carloman and Louis. The former, who now took the name of Pepin, had Lombardy; the latter Aquitain. Having then received the submission of Tassilon duke of Bavaria, he set out for Saxony, where he took a most severe revenge on the people of that country for the many treacheries they had been guilty of. The present revolt was chiefly owing to a chief named Witikind, who had twice before fled from the victorious arms of Charles, and taken refuge at the court of Denmark. Returning from thence in the king's absence, he roused his countrymen to action, while the generals of Charles, disagreeing among themselves, neglected to take the proper methods for repelling the enemy. In consequence of this, they were entirely defeated on the banks of the Weser in the year 782. Charles arrived in time to prevent the total destruction of his people, and directly penetrated into the heart of the country. Witikind, unable to resist his antagonist, once more fled into Denmark; but 4500 of his followers perished at once by the hands of the executioner. An universal insurrection was the consequence of this unheard-of cruelty; and though during three years the French monarch was constantly successful in the field, he found it impossible by any force whatever to subdue the

spirit of the people. At last therefore he was obliged to have recourse to negotiation. Witikind and several other chiefs were invited to an interview; where Charles represented to them in such strong colours the ruin which must necessarily ensue to their country by persisting obstinately in opposition to him, that they were induced not only to persuade their countrymen finally to submit, but to embrace the Christian religion.

Charles having thus brought his affairs in Saxony to an happy conclusion, turned his arms against Tassilon duke of Bavaria, who had underhand supported the Saxons in their revolt. Having entered his country with a powerful army in the year 787, he made such rapid advances, that the total destruction of Tassilon seemed inevitable. Charles had advanced as far as the river Lech, when Tassilon privately entered his camp, and threw himself at his feet. The king had compassion on his faithless kinsman on seeing him in this abject posture; but no sooner did the traitor find himself at liberty, than he stirred up the Huns, the Greek emperor, and the fugitive Adalgise, against the king. He fomented also the discontents of the factious nobles of Aquitain and Lombardy; but his subjects, fearing lest these intrigues should involve them in destruction, made a discovery of the whole to Charles. Tassilon, ignorant of this, entered the diet at Ingelheim, not suspecting any danger, but was instantly arrested by order of the French monarch. Being brought to a trial, the proofs of his guilt were so apparent, that he was condemned to lose his head: the punishment, however, was afterwards mitigated to perpetual confinement in a monastery, and the duchy of Bavaria was annexed to the dominions of Charles.

The Huns and other enemies of the French monarch continued to prosecute their enterprises without regarding the fate of their associate Tassilon. Their attempts, however, only served to enhance the fame of Charles. He defeated the Huns in Bavaria, and the Greek emperor in Italy; obliging the latter to renounce for ever the fortune of Adalgise. The Huns, not disheartened by their defeat, continuing to infect the French dominions, Charles entered their country at the head of a formidable army; and having forced their entrenchments, penetrated as far as Raat on the Danube, but was compelled by an epidemic distemper to retire before he had finished his conquest. He was no sooner returned to his own dominions, than he had the mortification to be informed, that his eldest son Pepin had conspired against his sovereignty and life. The plot was discovered by a priest who had accidentally fallen asleep in a church where the conspirators were assembled. Being awakened by their voices, he overheard them consulting on the proper measures for completing their purpose; on which he instantly set out for the palace, and summoned the monarch from his bed to inform him of the guilt of his son. Pepin was seized, but had his life spared, tho' condemned to expiate his offences by spending the remainder of his days in a monastery.

Charles was no sooner freed from this danger than he was again called to arms by a revolt of the Saxons on the one hand, while a formidable invasion of the Moors distressed him on the other; the Huns at the same time renewing their depredations on his dominions.

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France.

nions. The king did not at present make war against the Moors; probably foreseeing that they would be called off by their Christian enemies in Spain. This accordingly happened; the victories of Alonso the Chaste obliged them to leave France; after which Charles marched in person to attack the Saxons and Huns. The former consented again to receive the Christian religion, but were likewise obliged to deliver up a third part of their army to be disposed of at the king's pleasure; but the Huns defended themselves with incredible vigour. Though often defeated, their love of liberty was altogether invincible; so that the war was not terminated but by the death of the king, and an almost total destruction of the people: only one tribe could be induced to acknowledge the authority of the French monarch.

These exploits were finished betwixt the years 793 and 798; after which Charles invaded and subdued the island of Majorca and Minorca; which the dissensions of the Moorish chiefs gave him an opportunity of doing. The satisfaction he felt from this new conquest, however, was soon damped by the troubles which broke out in Italy. After the death of pope Adrian, his nephew aspired to the papal dignity; but a priest named Leo being preferred, the disappointed candidate determined on revenge. He managed matters so well, that his designs were concealed for four years. At last, on the day of a procession, a furious assault was made on the person of Leo. The unfortunate pontiff was left for dead on the ground; but having with difficulty recovered, and made his escape to the Vatican, he was protected by the duke of Spoleto, at that time general of the French forces. His cause was warmly espoused by Charles, who invited him to his camp at Paderborn in Westphalia; whence he dispatched him with a numerous guard to Rome, promising soon after to visit that metropolis, and redress all grievances. His attention for the present, however, was called by the descents of the Normans on the maritime provinces of his dominions; so that he was obliged to defer the promised assistance for some time longer. Having constructed forts at the mouths of most of the navigable rivers, and further provided for the defence of his territories, by instituting a regular militia, and appointing proper squadrons to cruise against the invaders, he set out for the fourth and last time on a journey to Rome. Here he was received with the highest possible honours. Leo was allowed to clear himself by oath of the crimes laid to his charge by his enemies, while his accusers were sent into exile. On the festival of Christmas, in the year 800, after Charles had made his appearance in the cathedral of St Peter, and assisted devoutly at mass, the pope suddenly put a crown on his head; and the place instantly resounded with acclamations of "Long life to Charles the August, crowned by the hand of God! Long life and victory to the great and pacific emperor of the Romans!" His body was then consecrated and anointed with royal unction; and after being conducted to a throne, he was treated with all the respect usually paid to the ancient Cæsars; from this time also being honoured with the title of *Charlemagne*, or *Charles the Great*. In private conversation, however, he usually protested, that he was ignorant of the pope's intention at this time; and that, had he known it, he would have

disappointed him by his absence: but these protestations were not generally believed; and the care he took to have his new title acknowledged by the eastern emperors, evidently showed how fond he was of it.

Charles, now raised to the supreme dignity in the west, proposed to unite in himself the whole power of the first Roman emperors, by marrying Irene the empress of the east. But in this he was disappointed by the marriage of that princess by Nicephorus; however, the latter acknowledged his new dignity of Augustus, and the boundaries of the two empires were amicably settled. Charles was further gratified by the respect paid him by the great Haroun Al-Rasid, caliph of the Saracens, who yielded to him the sacred city of Jerusalem, and holy sepulchre there. But in the mean time his empire was threatened with the invasion of a very formidable enemy, whom even the power of Charles would have found it hard to resist. These were the Normans, at this time under the government of Godfrey a celebrated warrior, and who by their adventurous spirit, and skill in maritime affairs, threatened all the western coasts of Europe with desolation. From motives of mutual convenience a transitory peace was established, and Charles made use of this interval to settle the final distribution of his dominions. Aquitaine and Gascony, with the Spanish march, were assigned to his son Louis; Pepin had Italy confirmed to him; and to this was added the greatest part of Bavaria, with the country now possessed by the Grisons. Charles the eldest had Neustria, Austrasia, and Thuringia. The donation was supposed to be rendered more authentic by the sanction of the pope. This division, however, had scarce taken place, when the princes were all obliged to defend their dominions by force of arms. Louis and Pepin were attacked by the Saracens, and Charles by the Slavonians. All these enemies were defeated; but while Charles hoped to spend the short remainder of his life in tranquillity, he was once more called forth to martial exertions by the hostile behaviour of Godfrey the Norman leader. Charles sent him a message of defiance, which was returned in the same style by Godfrey: but the former, by artfully fomenting divisions among the northern powers, prevented for a while the threatened danger; but, these disturbances being quelled, the Normans renewed their depredations, and Charles was obliged to face them in the field. An engagement, however, was prevented by the death of Godfrey, who was assassinated by a private soldier; on which the Norman army retreated, and the dominions of the emperor still remained free from these invaders. Still the latter days of Charles were embittered by domestic misfortunes. His favourite daughter Rotrude died, as did also Pepin king of Italy; and these misfortunes were soon followed by the death of his eldest son Charles. The emperor then thought proper to associate his only surviving son Louis with him in the government; which was formally done at Aix-la-Chapelle. Charles himself survived this transaction only a few months; his death happened on the 27th of January 814; in the 71st year of his age, and 47th of his reign.

By the martial achievements of this hero, the French monarchy was raised to its utmost pitch of splendor. He had added the province of Aquitaine to the territories of his ancestors; he had confined the inhabitants

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28
He is
crowned
emperor
of
the west.

29
Death of
Charles the
Great.

30
Extent of
his territo-
ries.

bitants

France.

bitants of Brittany to the shores of the ocean, and obliged them to submit to a disgraceful tribute. He had reduced under his dominion all that part of Spain which extends from the Pyrenees to the river Ebro, and includes the kingdoms of Roussillon, Navarre, Aragon, and Catalonia. He possessed Italy from the Alps to the borders of Calabria; but the duchy of Beneventum, including most of the present kingdom of Naples, escaped the yoke after a transitory submission. Besides these extensive countries, Charles added to his territories the whole of Germany and Pannonia; so that the French now had the jurisdiction of all the country from east and west, from the Ebro in Spain to the Vistula; and from north to south, from the duchy of Beneventum to the river Eyder, the boundary between Germany and the dominions of Denmark. In acquiring these extensive dominions Charles had been guilty of horrid and repeated massacres; for which, however, he had been in some measure excusable by the barbarity and rebellious disposition of the people with whom he had to deal, upon whom no mild measures would probably have had any effect. His establishing of schools throughout the conquered provinces, showed also his inclination to govern his subjects in peace, and to take proper steps for their civilization; though indeed many parts of his private conduct showed no small inclination to cruelty; particularly the fate of the sons of Carloman, of whom no account could ever be obtained. His advice to his son Louis indeed was excellent; exhorting him to consider his people as his children; to be very mild and gentle in his administration, but firm in the execution of justice; to reward merit; promote his nobles gradually; choose ministers deliberately, but not remove them capriciously or without sufficient reason. All these prudent maxims,

31
Decline of
his empire.

32
Civil wars
among the
sons of
Louis the
Gentle.

however, were not sufficient to enable Louis to govern dominions so extensive, and people so turbulent as he had to deal with. At the time of the decease of his father this prince was about 36 years of age, and had married Ermengarde, daughter of the count of Hesbai of the diocese of Liege, by whom he had three sons, Lothaire, Pepin, and Louis. Lothaire, the eldest, was associated with himself in the empire, and the two youngest were entrusted with the governments of Aquitaine and Bavaria. Every one of the princes proved unfaithful to their father, as well as enemies to one another. The death of Ermengarde, and the marriage of the emperor with Judith a princess of Bavaria, artful but accomplished, proved the first source of calamity to the empire. In the year 823, Charles, the emperor's youngest son was born; and his pretensions became in time more fatal to the public tranquillity than the ambition and disobedience of all the rest. Various parts of the Imperial dominions were likewise assailed by foreign enemies. The inhabitants of Brittany and Navarre revolted; the Moors invaded Catalonia; while the ambition of Judith produced a war amongst the brothers themselves.

Charles at first had been appointed sovereign of that part of Germany bounded by the rivers Danube, the Rhine, the Neckar, and the Rhine; the country of the Grisons and Burgundy, comprehending Geneva and the Swiss cantons: but this was opposed by the three elder sons. Pepin and Louis advanced with the united forces of Aquitaine and Bavaria, while the Im-

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perial forces deserted their standard and joined the malcontents. The emperor was taken prisoner, and the empress retired to a monastery. Lothaire, the eldest of the young princes, to whom the rest found themselves obliged to submit, was the person who retained the emperor in his possession; but, notwithstanding his breach of duty, his heart was touched with remorse on account of the crimes he had committed. Dreading the reproach of the world at large, and being threatened with the censures of the church, he threw himself at his father's feet, and begged pardon for his guilt, consenting to relinquish the authority he had unjustly usurped. Thus Louis was re-established in his authority by the diet of the empire which had met to depose him. His first step was to recal his empress from the monastery to which she had retired; but this princess, implacable in her resentment, now persecuted Lothaire to such a degree, that he was obliged to join his two brothers Pepin and Louis in a confederacy against their father. The old emperor thought to check this rebellious disposition by revoking his grant of Aquitaine to Pepin, and conferring it on his youngest son Charles, then only nine years of age; but pope Gregory IV. conferred the Imperial dignity itself on Lothaire, deposing the unhappy monarch, and again sending the empress to a nunnery in the forest of Arden. The unnatural behaviour of his sons, however, once more excited the compassion of his subjects. Dreux, the bishop of Mentz, used his interest with Louis king of Bavaria to arm his subjects in defence of his father and sovereign. In this enterprise the Bavarian monarch was joined by the French and Saxons; so that the aged emperor was once more restored, the empress released from her nunnery, and Charles from his prison, in the year 833.

The ambition of Judith now set matters once more in a flame. Taking advantage of the affection her husband bore her, she persuaded him to invest her son Charles with the sovereignty of Neustria as well as the dominions formerly assigned him. This was productive of great discontents on the part of Lothaire and Pepin; but their power was now too much broken to be able to accomplish any thing by force of arms. The death of Pepin, which happened soon after, produced a new division of the empire. The claims of young Pepin and Charles, sons of the deceased prince, were entirely disregarded, and his French dominions divided between the two brothers Charles and Lothaire, the latter being named guardian to his infant nephew. This enraged Louis of Bavaria, whose interest was entirely neglected in the partition, to such a degree, that he again revolted; but the unexpected appearance, with the hostile preparations of the Saxons, obliged him to submit and ask pardon for his offences. Still, however, the ambition of the empress kept matters in a continual ferment, and the empire was again threatened with all the calamities of civil war; but before these took place, the emperor died, in 841, after a most unfortunate reign of 27 years.

Louis was eminent for the mildness of his manners and peaceful virtues, which procured him the title of *Le Debonnaire*, or "the gentle:" but such was the turbulence and excessive barbarity of the age in which he lived, that all his virtues, instead of procuring him respect

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respect and esteem, were productive only of contempt and rebellion from those whom both duty and nature ought to have rendered the most submissive and obedient.

The decease of the emperor was followed by a civil war among his sons. The united forces of Lothaire and his nephew Pepin were defeated by those of Charles and Louis in a very bloody battle in the plains of Fontenoy, where 100,000 Franks perished, in the year 842. This victory, however, bloody as it was, did not decide the fortune of the war. The conquerors having, through motives of interest or jealousy, retired each into their own dominions, Lothaire found means not only to recruit his shattered forces, but pressed the other two princes so vigorously, that they were glad to consent to a new partition of the empire. By this Lothaire was allowed to possess the whole of Italy, with the whole tract of country between the rivers Rhone and Rhine, as well as that between the Meuse and Scheld. Charles had Aquitaine, with the country lying between the Loire and the Meuse; while Louis had Bavaria, with the rest of Germany, from whence he was distinguished by the appellation of *Louis the German*.

33
Division of
the empire.

By this partition, Germany and France were divided in such a manner as never afterwards to be united under one head. That part of France which was allowed to Lothaire, was from him called *Lotharingia*, and now *Lorraine*, by a gradual corruption of the word. The sovereignty, however, which that prince had pursued at the expence of every filial duty, and purchased at so much blood, afforded him now but little satisfaction. Disgusted with the cares and anxieties of his situation, he sought relief in a monastery in the year 855. On his retreat from the throne, he allotted to his eldest son Louis II. the sovereignty of Italy; to his second son Lothaire the territory of Lorraine, with the title of king; and to his youngest son Charles, furnished the *Bald*, Provence, Dauphiny, and part of the kingdom of Burgundy; so that he may be considered as properly the king of France. From the year 845 to 857 the provinces subjected to his jurisdiction had been infested by the annual depredations of the Normans, from whom Charles was at last fain to purchase peace at a greater expence than might have carried on a successful war. The people of Brittany had also revolted; and though obliged by the appearance of Charles himself, at the head of a powerful army, to return to their allegiance, they no sooner perceived him again embarrassed by the incursions of the Normans, than they threw off the yoke, and under the conduct of their duke Louis subdued the neighbouring diocese of Rennes; after which exploit Louis assumed the title of king, which he transmitted to his son Herispee. By him Charles was totally defeated; and his subjects, perceiving the weakness of their monarch, put themselves under the protection of Louis the German. His ambition prompted him to give a ready ear to the proposal; and therefore, taking the opportunity of Charles's absence in repelling an invasion of the Danes, he marched with a formidable army into France, and was solemnly crowned by the archbishop of Sens in the year 857. Being too confident of success, however, and fancying himself already established on the throne, he was persuaded

34
Lothaire
resigns.

35
Reign of
Charles the
Bald.

to dismiss his German forces; which he had no sooner done, than Charles marched against him with an army, and Louis abandoned his new kingdom as easily as he had obtained it.

Notwithstanding this success, the kingdom of Charles continued still in a very tottering situation. The Normans harassed him in one quarter, and the king of Brittany in another. He marched against the latter in the year 860; but had the misfortune to receive a total defeat after an engagement which lasted two days. The victory was chiefly owing to a noted warrior named Robert le Fort, or the Strong, who commanded the Bretons; but Charles found means to gain him over to his party by investing him with the title of Duke of France, including the country which lies between the rivers Seine and Loire.

For some time the abilities of Robert continued to support the tottering throne of Charles; but his difficulties returned on the death of that hero, who was killed in repelling an invasion of the Danes. Some amends was indeed made for his loss by the death of the king of Lorraine in the year 869; by which event the territories of Charles were augmented by the cities of Lyons, Vienne, Toul, Besançon, Verdun, Cambray, Viviers, and Urez, together with the territories of Hainault, Zealand, and Holland. Cologne, Utrecht, Treves, Mentz, Straßburgh, with the rest of the territories of Lothaire, were assigned to Louis the German.

All this time the Normans still continued their incursions to such a degree, that Solomon king of Brittany was persuaded to join his forces to those of Charles, in order to repel the common enemy. The event proved unfortunate to the Normans; for their principal leaders were besieged in Angiers, and obliged to purchase leave to depart by relinquishing all the spoil they had taken. Charles thus freed from a formidable enemy, began to aspire to the imperial crown, which about this time became vacant by the death of Louis. This belonged of right to Louis the German; but Charles, having instantly assembled a powerful army, marched with it into Italy before Louis could be apprised of his designs; and being favourably received at Rome, the Imperial crown was put upon his head without any hesitation by the Pope, in the year 873. Louis, enraged at his disappointment, discharged his fury on the defenceless country of Champagne; and though the approach of Charles obliged him for the present to retire, yet he continued his preparations with such vigour, that Charles would in all probability have found him a very formidable adversary, had he not been taken off by death in the year 877. Charles was no sooner informed of his brother's decease, than he invaded the dominions of his son Louis, who possessed Franconia, Thuringia, the Lower Lorraine, with some other territories in that quarter. The enterprise, however, proved unsuccessful. Charles, though superior in numbers, was defeated with great slaughter, and had scarce time to reunite his scattered forces, when he was informed that the Normans had invaded his territories, laid waste part of the country, and taken possession of the city of Rouen. So many disasters affected him in such a manner that he fell dangerously ill, and was scarce recovered of his sickness when he found himself called into Italy to the assistance of the Pope against

France.

France.

the Saracens, whose invasions were encouraged by the dukes of Beneventum and the Greek emperor. Charles passed into Italy with only a few followers; but when he came to Pavia, at which place the pontiff had appointed to meet him, was informed that Carloman king of Bavaria, and son of Louis the German, was already in Italy with a powerful army, and laid claim to the imperial title in virtue of his father's right. Charles prepared to oppose him by force of arms; but his generals conspired against him, and the soldiers declared their resolution not to pass the Alps. On this he was obliged to retire to France, at the very moment that Carloman, dreading his power, prepared to return to Germany. This was the last of Charles's enterprises. His journey brought on a return of his indisposition, which was rendered fatal through the treachery of a Jewish physician named Zedechias, who administered poison to him under pretence of curing his malady. He expired in a miserable cottage upon mount Cenis in the 54th year of his age, and 38th of his reign over the kingdom of France.

36
He is poi-
soned.

37
Reign of
Louis the
Stammerer.

The ambition of Charles had been productive of much distress both to himself and to his subjects. His son Louis, surnamed, from a defect in his speech, *the Stammerer*, was of a quite different disposition; but his feeble administration was ill calculated to retrieve matters in their present situation. He died on the 10th of April 879, while on a march to suppress some insurrections in Burgundy. He left his queen Adelaide pregnant; who some time after his decease was delivered of a son, named *Charles*. After his death followed an interregnum; during which a faction was formed for setting aside the children of Louis the Stammerer, in favour of the German princes, sons to Louis the brother of Charles the Bald. This scheme, however, proved abortive; and the two sons of the late king, Louis and Carloman, were crowned kings of France. Another kingdom was at that time erected by an assembly of the states, namely, the kingdom of Provence, which consisted of the countries now called *Lyonnois*, *Savoie*, *Dauphiny*, *Franche Comte*, and part of the duchy of Burgundy; and this kingdom was given to duke Boson, brother-in-law to Charles the Bald. In 881, both kings of France died; Louis, as was suspected, by poison; and Carloman of a wound he received accidentally while hunting. This produced a second interregnum; which ended with the calling in of Charles the Gross, emperor of Germany. His reign was more unfortunate than that of any of his predecessors. The Normans, to whom he had given leave to settle in Friesland, sailed up the Seine with a fleet of 700 ships, and laid siege to Paris. Charles, unable to force them to abandon their undertaking, prevailed on them to depart by a large sum of money. But as the king could not advance the money at once, he allowed them to remain in the neighbourhood of Paris during the winter; and they in return plundered the country, thus amassing vast wealth besides the sum which Charles had promised. After this ignominious transaction Charles returned to Germany, in a very declining state of health both as to body and mind. Here he quarrelled with his empress; and being abandoned by all his friends, he was deposed, and reduced to such distress, that he would not even have had bread to eat,

had not he been supplied by the archbishop of Mentz, out of a principle of charity.

France.

On the deposition of Charles the Gross, Eudes count of Paris was chosen king by the nobility during the minority of Charles the son of Adelaide, afterwards named *Charles the Simple*. He defeated the Normans, and repressed the power of the nobility; on which account a faction was formed in favour of Charles, who was sent for, with his mother, from England. Eudes did not enter into a civil war; but peaceably resigned the greatest part of the kingdom to him, and consented to do homage for the rest. He died soon after this agreement, in the year 898.

During the reign of Charles the Simple, the French government declined. By the introduction of fiefs, those noblemen who had got into the possession of governments, having these confirmed to them and their heirs for ever, became in a manner independent sovereigns: and as these great lords had others under them, and they in like manner had others under them, and even these again had their vassals; instead of the easy and equal government which prevailed before, a vast number of insupportable little tyrannies were erected. The Normans, too, ravaged the country in the most terrible manner, and desolated some of the finest provinces in France. At last Charles ceded to Rollo, the king or captain of these barbarians, the duchy of Neustria; who thereupon became Christian, changed his own name to *Robert*; and that of his principality to *Normandy*.

During the remainder of the reign of Charles the Simple, and the entire reigns of Louis IV. surnamed the *Stranger*, Lothaire, and Louis V. the power of the Carolingian race continually declined; till at last they were supplanted by Hugh Capet, who had been created duke of France by Lothaire. This revolution happened in the year 987, and was brought about much in the same manner as the former one had been by Pepin. He proved an active and prudent monarch, and possessed such other qualities as were requisite for keeping his tumultuous subjects in awe. He died on the 24th of October 997, leaving his dominions in perfect quiet to his son Robert.

38
Family of
Charles the
Great sup-
planted by
Hugh Ca-
pet.

The new king inherited the good qualities of his father. In his reign the kingdom was enlarged by the death of Henry duke of Burgundy, the king's uncle, to whom he fell heir. This new accession of territory, however, was not obtained without a war of several years continuance on account of some pretenders to the sovereignty of that duchy; and had it not been for the assistance of the duke of Normandy, it is doubtful whether the king would have succeeded.—As Robert was of opinion, that peace and tranquillity were preferable to wide extended dominions with a precarious tenure, he refused the kingdom of Italy and the imperial crown of Germany, both which were offered him. He died on the 20th of July 1030; having reigned 33 years, and lived 60.

39
Robert.

Robert was succeeded by his eldest son Henry I. Henry I. who in the beginning of his reign met with great opposition from his mother. She had always hated him; and preferred his younger brother Robert, in whose favour she now raised an insurrection. By the assistance of Robert duke of Normandy, however, Henry over-

came

France.

came all his enemies, and established himself firmly upon the throne. In return for this, he supported William, Robert's natural son, and afterwards king of England, in the possession of the duchy of Normandy. Afterwards, however, growing jealous of his power, he not only supported the pretenders to the duchy of Normandy secretly, but invaded that country himself in their favour. This enterprize proved unsuccessful, and Henry was obliged to make peace: but no sincere reconciliation ever followed; for the king retained a deep sense of the disgrace he had met with, and the duke never forgave him for invading his dominions. The treaty between them, therefore, was quickly broken; and Henry once more invaded Normandy with two armies, one commanded by himself, and the other by his brother. The first was harassed by continual skirmishes, and the last totally defeated; after which Henry was obliged to agree to such terms as the duke thought proper: but the rancour between them never ceased, and was in reality the cause of that implacable aversion which for a long series of years produced perpetual quarrels between the kings of France and those of the Norman race in England.

41 Philip.

Henry died in 1059, not without a suspicion of being poisoned; and was succeeded by his eldest son Philip, at that time in the eighth year of his age. Baldwin earl of Flanders was appointed his guardian; and died in the year 1066, about the time that William of Normandy became king of England. After the death of his tutor, Philip began to show a very insincere, haughty, and oppressive disposition. He engaged in a war with William the Conqueror, and supported his son Robert in his rebellion against him*. But after the death of William, he assisted Robert's brothers against him; by which means he was forced to consent to a partition of his dominions.

* See England, n^o 89.

In 1092, king Philip being wearied of his queen Bertha, procured a divorce from her under pretence of consanguinity, and afterwards demanded in marriage Emma daughter to Roger count of Calabria. The treaty of marriage was concluded; and the princess was sent over, richly adorned with jewels, and with a large portion in ready money: but the king, instead of espousing her, retained her fortune, and dismissed the princess herself, carrying off from her husband the countess of Anjou, who was esteemed the handsomest woman in France. With her he was so deeply enamoured, that not satisfied with the illegal possession of her person, he procured a divorce between her and her husband, and prevailed upon some Norman bishops to solemnize his own marriage with her. The whole of these transactions, however, were so scandalous, that the pope having caused them to be revised in a council at Autun, in the year 1094, pronounced sentence of excommunication against Philip in case he did not part with the countess. On his repentance, the censure was taken off; but as the king paid no regard to his promises, he was, in 1095, excommunicated a second time. He again professed repentance, and was absolved; but soon after, living with the countess of Anjou as formerly, he was excommunicated a third time. This conduct, so unworthy of a prince, exposed him to the contempt of the people. Too many of the nobility followed his example, and at the same time despised his authority; not only making war up-

on each other, but spoiling and robbing his subjects with impunity.

France.

In the year 1110, Philip prevailed on the court of Rome to have his affair reviewed in an assembly at Poitiers; where, notwithstanding his utmost efforts, sentence of excommunication was a fourth time pronounced against him. Yet, in spite of all these sentences, as queen Bertha was dead, and the count of Anjou offered, for a large sum of money, to give whatever assistance was requisite for procuring a dispensation, Philip at last prevailed, and the countess was proclaimed queen of France. But though the king's domestic affairs were now in some measure quieted, his negligence in government had thrown the affairs of the nation into the greatest disorder. He therefore associated with him in the government his eldest son Louis. This prince was the very reverse of his father; and by his activity and resolution, keeping constantly in the field with a considerable body of forces, he reduced the rebellious nobility to subjection, and, according to the best historians, at this time saved the state from being utterly subverted.

For these services the queen looked upon the young prince with so jealous an eye, and gave him so much disturbance, that he found it necessary to retire for some time into England; where he was received by king Henry I. with the greatest kindness. He had not been long at court, before Henry received, by an express, a letter from Philip; telling him, that, for certain important reasons, he should be glad if he closely confined his son, or even dispatched him altogether. The king of England, however, instead of complying with this infamous request, showed the letter to Louis, and sent him home with all imaginable marks of respect. Immediately on his return, he demanded justice; but the queen procured poison to be given him, which operated so violently that his life was despaired of. A stranger, however, undertook the cure, and succeeded; only a paleness remained in the prince's face ever afterwards, though he grew so fat that he was surnamed *the Gros*.

On his recovery, the prince was on the point of revenging his quarrel by force of arms; but his father having caused the queen to make the most humble submissions to him, his resentment was at length appeased, and a perfect reconciliation took place.

Nothing memorable happened in the reign of king Philip after this reconciliation. He died in the year 1108, and was succeeded by his son Louis the Gros⁴². The first years of his reign were disturbed by insurrections of his lords in different places of the kingdom; and these insurrections were the more troublesome, as they were secretly fomented by Henry I. of England, that by weakening the power of France his duchy of Normandy might be the more secure. This quickly brought on a war; in which Henry was defeated, and his son William obliged to do homage to Louis for the duchy of Normandy. As the kings of England and France, however, were rivals, and exceedingly jealous of each other, the latter espoused the cause of William the son of Robert duke of Normandy, whom Henry had unjustly deprived of that duchy. This brought on a new war; in which Louis, receiving a great defeat from Henry, was obliged to make peace upon such terms as his antagonist thought

France.

proper. The tranquillity, however, was but of short duration. Louis renewed his intrigues in favour of William, and endeavoured to form a confederacy against Henry; but the latter found means not only to dissipate this confederacy, but to prevail upon Henry V. emperor of Germany to invade France with the whole strength of the empire on one side, while he prepared to attack it on the other. But Louis having collected an army of 200,000 men, both of them thought proper to desist. Upon this the king of France would have marched into Normandy, in order to put William in possession of that duchy. His great vassals, however, told him they would do no such thing; that they had assembled in order to defend the territories of France from the invasion of a foreign prince, and not to enlarge his power by destroying that balance which arose from the king of England's possession of Normandy, and which they reckoned necessary for their own safety. This was followed by a peace with Henry; which, as both monarchs had now seen the extent of each other's power, was made on pretty equal terms, and kept during the life of Louis, who died in 1137, leaving the kingdom to his son Louis VII.

43
Louis VII.
a weak
prince.

The young king was not endowed with any of those qualities which constitute a great monarch. From the superstition common to the age in which he lived, he undertook an expedition into the Holy Land, from whence he returned without glory. In this expedition he took his queen Eleanor along with him; but was so much offended with her gallantries during her stay there, as well as her behaviour afterwards, that he divorced her, and returned the duchy of Guienne which he received with her as a portion. Six weeks after this she married Henry duke of Normandy, count of Anjou and Maine, and heir-apparent to the crown of England. This marriage was a very great mortification to Louis; and procured him the surname of *the Young*, on account of the folly of his conduct. When Henry ascended the throne of England, some wars were carried on between him and Louis, with little advantage on either side: at last, however, a perfect reconciliation took place; and Louis took a voyage to England, in order to visit the shrine of St Thomas of Canterbury. On his return he was struck with an apoplexy; and though he recovered for that time, yet he continued ever after paralytic on the right side. After having languished for about a year under this malady, he died on the 18th of September 1180, leaving the kingdom to his son Philip.

44
Philip the
Great.

This prince, surnamed *The Gift of God*, *The Magnanimous*, and *The Conqueror*, during his lifetime; and, as if all these titles had fallen short of his merit, styled *Augustus* after his death,—is reckoned one of the greatest princes that ever sat on the throne of France, or any other.—It doth not, however, appear that these titles were altogether well founded. In the beginning of his reign he was opposed by a strong faction excited by his mother. Them indeed he repressed with a vigour and spirit which did him honour; but his taking part with the children of Henry II. of England in their unnatural contests with their father, and his treacherous combination with John to seize his brother's kingdom when he was detained in prison by the emperor of Germany, must be indelible stains in his

character, and for ever exclude him from the title of *Magnanimous*. As to military skill and personal valour, he was evidently inferior to Richard I. of England; nor can his recovering of the provinces held by the English in France, from such a mean and dastardly prince as king John, intitle him with any justice to the surname of *Conqueror*. In politics he was evidently the dupe of the Pope, who made use of him to intimidate John into a submission, by promising him the kingdom of England, which he never meant that he should enjoy. An account of these transactions, which are the principal ones of this reign, is given under the article ENGLAND, n° 121—141.

Philip died in 1223, and was succeeded by his son Louis VIII. and he, in 1226, by Louis IX. afterwards styled *St Louis*. This prince was certainly possessed of many good qualities, but deeply tinged with the superstition of the times. This induced him to engage in two croisades. The first was against the Saracens in Egypt: in which he was taken prisoner by the Infidels, and treated with great cruelty; but at last obtained his ransom, on condition of paying a million of pieces of gold, and surrendering the city of Damietta. He no sooner regained his liberty, than he entered Syria with a view of doing something worthy of his rank and character. From this expedition he was obliged to return sooner than he intended, by the news of the decease of his mother queen Blanch, whom he had appointed regent in his absence, and who had managed the national affairs with the greatest prudence. The king, however, found many disorders in the kingdom upon his return; and these he set himself to reform with the utmost diligence. Having succeeded in this, he yielded to Henry III. of England, the Limousin, Querci, Perigord, and some other places; in consideration of Henry and his son prince Edward their renouncing, in the fullest manner, all pretensions to Normandy and the other provinces of France which the English had formerly possessed.

The reputation of this monarch for candour and justice was so great, that the barons of England, as well as king Henry III. consented to make him umpire of the differences which subsisted between them. But though he decided this matter very justly, his decision was not productive of any good effect. At last the king, having settled every thing relating to his kingdom in a proper manner, set out on another croisade for Africa; where he died of the plague, on the 25th of August 1270.

Notwithstanding the misfortunes of Louis, his successor Philip, surnamed *the Hardy*, continued the war against the Infidels with great vigour. Being reinforced by his uncle Charles king of Sicily, he brought the war to a more fortunate conclusion than his predecessor had been likely to do. The Saracens were defeated in two engagements, and the king of Tunis obliged to sue for peace; offering at the same time to double the tribute he formerly paid to the crown of Sicily; to reimburse the expences of the war; and to permit the Christian religion to be freely propagated throughout his dominions. Having accomplished this, the two princes set sail for Europe; but the seeds of the distemper which had infected the army in Africa not being eradicated, broke forth on their arrival in Sicily, and raged for some time with great violence.

Besides

France.

45
Reign of
Louis IX.

46
Philip the
Hardy.

France.

Besides a vast number of common people, the king's brother John, his queen Isabella, with his brother and sister-in-law the king and queen of Navarre, and his uncle and aunt the count and countess of Poitiers, perished by this dreadful malady.

On his return to France, Philip took possession of the counties of Provence and Thoulouse; married his second son, though then very young, to the only daughter of the king of Navarre; while he himself espoused Mary the daughter of the duke of Brabant, reckoned one of the most beautiful princesses of the age. He steadily enforced the regulations of his predecessor, who had prohibited the barons from making private wars upon one another; procured the friendship of Edward I. of England by ceding to him the county of Agenois; and entered into a war with Spain in order to support the pretensions of his nephews, the Infants de la Cerda, to the throne of Castile.

The events of this war were of no great importance; and the king's attention was quickly called off from them by the death of his eldest son Louis at the age of twelve years. This disastrous event happened in the year 1275, not without a suspicion of poison; and the young queen, Mary, was accused by a surgeon named La Brosse as guilty of his death. Philip gave some credit to the accusation; but having applied to a nun, who pretended to be inspired, for full satisfaction, her answer proved fatal to La Brosse. The queen being cleared by this pretended prophetess, La Brosse was accused of a treasonable correspondence with the king of Castile, and condemned to death. The manner of his trial and execution, however, were such, that the tide of popular favour was turned; La Brosse was by the voice of the people declared to be innocent, and the king and queen themselves loudly condemned. During these unfavourable circumstances, the Sicilians, over whom Charles of Anjou had established his authority, instigated by John of Procida, a noble exile, came to a resolution of freeing themselves at once from the French yoke by a general massacre. This cruel resolution was accordingly put in execution; and the French, to the number of 8000, murdered in one night; after which Peter of Arragon failed to the island, where he was received by the inhabitants as their king and saviour. Charles was sensibly affected by this misfortune; and having laid siege to Messina, failed directly to Marseilles, where he obtained a powerful reinforcement. But during his absence on this occasion, his son, to whom he had entrusted the care of the siege, having rashly ventured an engagement with the Spanish fleet, was entirely defeated and taken prisoner; which so much affected the father that he died of grief, and Sicily was inseparably attached to the house of Arragon.

The misfortunes of Charles were followed by others equally great to Philip himself. Pope Martin IV. in the warmth of his zeal for the cause of the duke of Anjou, had excommunicated Pedro king of Arragon, and bestowed his kingdom on Charles of Valois, a younger son of the king of France. In attempting to defend himself against the execution of this unjust sentence, Pedro was mortally wounded; but, soon after, the French fleet being defeated by that of Arragon, the king was so much affected by the misfortune that he fell sick. His disease was augmented by the

heat of the climate and the fatigues of war; so that, quite worn out with grief and infirmities, he expired at Perpignan in the 41st year of his age, and 16th of his reign.

By the death of Philip the Hardy the French crown devolved on his second son, called also Philip, and from the beauty of his person surnamed *the Fair*; who had espoused the princess of Navarre, and at the time of his accession was in his 17th year. By the marriage with this princess he had obtained the counties of Champagne and Brie; yet with all this increase of power he found himself unable to support the war in which his predecessor had engaged. For this reason he thought proper to abandon the interest of the Infants de la Cerda, and settle the differences with Castile. The treaty was concluded by the mediation of Edward I. of England; at whose intercession Charles the Lame, son to the duke of Anjou already mentioned, was released from his captivity; Edward himself paying part of his ransom. On this Charles consented to renounce his claim on Sicily; and Philip himself promised that his kinsman, Philip of Valois, should renounce all pretensions to the crown of Arragon. In return for this generosity, the latter obtained the eldest daughter of Charles, with the territories of Anjou and Maine as a dowry.

The tranquillity procured by this treaty, however, was soon interrupted by differences with Edward the promoter of it; pope Boniface VIII. and Guy de Dampier, count of Flanders. The difference with England took place by a mere accident. A Norman and an English vessel having met off the coast of Bayonne, and having both occasion for water, the crews met and quarrelled at the same spring. A Norman was killed in the squabble by his own weapon, with which he assaulted an Englishman, as the latter pretended: but however the matter was, complaints were made by the Normans to Philip; who, without giving himself much trouble to inquire into the merits of the cause, instantly allowed them to redress their supposed injuries. On this a kind of piratical war commenced between the two nations, in which the two sovereigns for some time took no active part; though other nations interfered; the Irish and Dutch seamen siding with the English, and those of Flanders and Genoa with the French. Thus the powers on both sides were gradually augmented, till at last the affair became so serious, that in one engagement 15,000 French are said to have perished. Philip, alarmed at such a carnage, summoned the king of England as his vassal to attend; and, on his refusal, declared his estates in France to be forfeited. After a number of negotiations, Philip declared that he would be satisfied with the nominal cession of the province of Guienne, which he engaged instantly to restore to the king of England as soon as it should be put into his hands. Edward complied with his demand: but no sooner had the French monarch obtained possession of that country, than he persisted in the forfeiture of the English possessions in France; which treacherous proceeding instantly produced a war betwixt the two nations. Edward, that he might the better defend himself against such a formidable adversary, concluded a treaty with the emperor Adolphus, together with the counts of Brittany, Holland, Bar, Juliers, Gueldres, and Flanders;

France.

48
Reign of
Philip the
Fair.

49
Difference
with Eng-
land.

47
French
massacred
in Sicily.

France. ders; while Philip strengthened himself by an alliance with John Baliol of Scotland; and this laid the foundation of that strict union which took place between France and Scotland for two centuries. During this war the French made a descent on the coast of England, and destroyed the town of Dover; while Edward, in revenge, landed in Gascony with an army of 50,000 men. No great exploits, however, were performed with this mighty armament; and both parties finding themselves pretty equally matched, consented to a suspension of arms for two years; during which a peace was finally concluded by the mediation of pope Boniface VIII. Guienne was restored; Edward espoused Margaret the sister of Philip; while his daughter Isabella was given in marriage to the prince of Wales.

50
Peace concluded.

Both Philip and Edward behaved to the allies whom they had engaged in their cause with equal perfidy. Baliol was abandoned by Philip to the resentment of Edward; while Guy, earl of Flanders, was left equally exposed to the resentment of Philip.

51
Difference with Pope Boniface.

The reconciliation betwixt the French and English monarchs was soon followed by a difference with pope Boniface, whom they had appointed mediator between them. Sensible of his assuming disposition, however, they had inserted in the reference made to him, that he was chosen as a private man, and not as the successor of St Peter. The haughty pontiff, however, soon showed, that he was not by any means to be treated as a private person, and a contest with Philip quickly ensued. Boniface began with forbidding the clergy to grant the king any subsidies without first obtaining the consent of the Holy See, under the pain of excommunication. Philip revenged himself by prohibiting any ecclesiastics from sending money out of the kingdom without his leave; and by protecting the Colonnas, who were the implacable enemies of Boniface. By this his holiness was so much irritated that he sent a most abusive letter to Philip; after which he summoned the clergy of France to a council at Rome; which Philip retaliated, by seizing the temporalities of those who obeyed the summons, and recalling his brother Charles of Valois, who had the title of the pope's general. Sensible, however, of the danger that attended this contest, he dispatched two emissaries, under pretence of conciliating the differences, to levy such a body of troops as might execute his hostile purposes against the holy father. With these he suddenly invested the pope in his native city of Anagnina; and while the bull was preparing for the excommunication of Philip, and releasing his subjects from their obedience, the Pope himself was obliged to surrender prisoner to the troops of the prince whom he designed to anathematize.

52
Death of Boniface.

Though Boniface had been at this time delivered up to the troops of Philip through the treachery of the people of Anagnina, yet he was no sooner taken prisoner and brought to distress, than they rescued him from his guards and conveyed him to Rome, where he soon after died of grief and shame. His successor Benedict revoked the excommunication of Boniface, and attempted to regain the allegiance of Philip by gentle means: but, before this could be effected, he himself was cut off by death, not without strong suspicions of poison. After his decease Philip offered to procure

the papal chair for Bertrand archbishop of Bourdeaux, provided he would condemn the memory of Boniface, restore the honours and estates of the Colonnas which had been forfeited, allow him, for five years, the tenths of the clergy of France, and comply with a request which at that time it was not proper to divulge.

Bertrand having complied with the terms proposed by the king, ascended the papal throne by the name of Clement V. but narrowly escaped being killed on his return from the cathedral of Lyons, by the falling of a wall which had been overloaded by the number of people who came to see the procession; by which accident the duke of Brittany was killed, and the king and count of Valois considerably bruised. The new pope fixed his residence at Avignon, where he punctually complied with all the conditions of the treaty, except that of condemning the conduct of Boniface, which he absolutely refused to do; and, instead of doing so, vindicated with much solemnity, after having inquired into the matter, or pretended to do so. The other condition, which Philip had at first concealed, was discovered by the death of the emperor Albert of Austria; after which event he desired Clement to assist him in placing his brother Charles of Valois on the Imperial throne. But his holiness, apprehensive of the danger which might accrue to himself from being surrounded with the powerful relations of Philip, urged the diet to proceed instantly to an election; recommending to them Henry of Luxemburg as a proper person to fill the Imperial throne. In this scheme he succeeded so well, that the election was over before Philip could arrive at Avignon; and the only consolation the French monarch could obtain for his disappointment was the possession of the city of Lyons, which had hitherto maintained an independency under its archbishop; but was now persuaded to submit to the authority of Philip.

In the mean time Guy, earl of Flanders, being abandoned by his ally Edward king of England, was obliged to throw himself on the mercy of the French monarch, who had sent his brother, Charles of Valois, with a powerful army to invade his dominions. From the latter indeed he had obtained a promise, that if he could not, within a year, compose the differences subsisting between him and Philip, he should be at liberty to retire, and pursue what measures he pleased. But Philip, in order to gratify the resentment which his queen entertained against the captive prince, detained him, with two of his sons, in close confinement; while he himself entering Flanders in triumph, was every where received as sovereign of the country; and at his departure appointed John de Chatillon, a relation of the queen, to govern those newly acquired territories.

The new governor took care to repair the fortifications, which had been suffered to decay by reason of the assiduous application of the Flemings to trade; but being of a very haughty and tyrannical disposition, and the poverty of the times not allowing his master to keep regular garrisons, an insurrection quickly took place. This would have been effectually quelled by the diligence of the magistrates, had not Chatillon unluckily entered Bruges, and publicly displayed two hogheads of ropes, which he threatened to employ in the execution of the inhabitants. On this they flew

France. 55
The pope fixes his residence at Avignon.

54
Expedition of Philip against the earl of Flanders.

France. to arms, massacred 1500 French; Chatillon himself being obliged to escape their fury by swimming over the town ditch. The insurgents now, daily gathering strength, soon amounted to an army of 60,000 men, who laid siege to Courtray. Here they were rashly attacked in their trenches by the count d'Artois, who met with the reward of his temerity, being cut off with 20,000 of his troops. Philip determined on revenge; though the raising another army obliged him to debase the coin of the kingdom. Thus, however, he was enabled to enter Flanders with such a force as would probably have subdued the whole country, had not Edward artfully communicated to the queen of France, as a secret, a feigned correspondence between the French nobility and the court of Rome; by which false intelligence the king was induced to abandon the enterprise without performing any thing worthy of the armament he had fitted out. The war was continued for some time longer; but the attempts of Philip were constantly defeated by the steady valour of the Flemings; and the only recompence Philip obtained for all his trouble and expence was the city of Courtray.

53
The conquest of the country prevented by Edward III. of England

54
Expulsion of the knights Templars

The other remarkable transactions of this reign were the expulsion and confiscation of the estates of the Templars, who at that time enjoyed immense possessions in France. The confiscations took place without any form of trial, and upwards of 50 of them were put to death in a cruel manner. The grand-master, with three of his principal officers, were burnt by a slow fire in the presence of the king himself. The whole body of these unfortunate knights had been accused of the most gross and abominable sensuality. The particulars were revealed, or pretended to be so, by two criminals who received their pardon for the discoveries they made; and these discoveries were confirmed by the confession of the Templars themselves. But this confession was afterwards retracted, as being extorted from them by the fear of absolute destruction; and those who suffered, maintained their purity to the last: and on the whole, it was believed that Philip consulted his avarice rather than his justice by this cruel execution. The latter part of his life was embittered by domestic misfortunes. His three daughters-in-law, Margaret daughter of the duke, and Jean and Blanch, of the count of Burgundy, who had married his three sons Louis, Philip, and Charles, were accused of infidelity to their husbands. After a severe examination, Margaret and Blanch were condemned to perpetual imprisonment; in which situation Margaret was afterwards strangled by order of her husband Louis. Their paramours, Philip and Walter de Launay, two brothers, were slayed alive, and afterwards hung upon a gibbet, with an usher of the chamber, who had been their confidant. The uneasiness of mind which Philip suffered on this account is supposed to have impaired his health, and he died of a consumption in the year 1395, the 47th of his age, and 30th of his reign.

55
Reign of Louis the Boisterous.

On the accession of Louis, surnamed the *Boisterous* on account of his violent temper, he found his treasury so much exhausted, that he was obliged to delay for some time the ceremony of his coronation with his new queen Clemence, daughter of the king of Hungary. Finding the kingdom otherwise in a very distracted state, he applied himself very diligently to appease the discontents of his subjects, and conciliate their affection by every

means in his power. In this he was assisted by his uncle Charles of Valois, on whom he at length entirely devolved the government of the kingdom. This regent, however, behaved with such cruelty as is supposed to have proved fatal to the king himself; for having put to death a nobleman named *Enguerrand de Poitiers de Marigni*, who enjoyed the confidence of the late king, this cruelty was so much repented, that his friends were thought to have administered poison to the king; who expired suddenly after drinking a glass of cold water, in the 26th year of his age, and second of his reign. Immediately after his death, Charles prepared to dispute the sovereignty with the brothers of the late sovereign. Philip count of Poitou, the eldest brother, was at that time at Rome assisting in the election of a new pope; and it was not until a month after the death of his brother that he was able to put an end to the intrigues which took place on that occasion: but on his arrival in France, the throne was assigned to him by the unanimous voice of the people. His prospects, however, were for a short time clouded by the queen-dowager Clemence being delivered of a son, who has been enrolled among the kings of France under the name of *John I.* His death in three weeks secured the throne to Philip; who, on account of the tallness of his stature was surnamed the *Long*. His conduct proved superior to that of his predecessor, who had unsuccessfully attempted to subdue the Flemings, and had even suffered himself to be duped by their count; but Philip, by his vigorous behaviour, so reduced them, that they compelled their sovereign to consent to a peace upon honourable terms. He summoned Edward II. of England to do homage for his possessions in France; but that monarch, finding himself involved in difficulties, which rendered the visit inconvenient, sent excuses to Philip, which he was pleased to accept. As the French monarch had formerly taken the cross during the lifetime of his father, he now proposed to put his vow in execution; but was dissuaded from this by the pope himself, at whose instance he sent an army into Italy to put an end to the contending factions of the Guelphs and Gibelins, who for so long time filled that country with blood and slaughter. The event proved unfortunate; and the disgrace was rendered more mortifying by a contagious distemper, which swept off many thousands of French subjects. This was supposed by the superstitious people of those times to be occasioned by the Jews, who had conspired with the Saracens to poison the springs; and that the execution of the project was committed to some lepers who lived by themselves in hospitals richly endowed. On this a persecution was instantly commenced against these unfortunate men, and great numbers of them were burnt alive; while the Jews in general were abandoned to the rage of the populace, who insulted their persons, and plundered their houses without remorse.

The remaining part of the reign of Philip was spent in attempting to regulate the internal concerns of his kingdom. A design had been formed by his predecessors of establishing a certain standard for the coin, weights, and measures, throughout France: and this was adopted by Philip; who, in order to carry it more effectually into execution, purchased from the counts of Valois, Clermont, and Bourbon, their right of coinage,

France.

56
Reign of Philip the Long.

57
Unfortunate expedition into Italy.

France. coinage within their own dominions. But notwithstanding all his endeavours for this purpose, he never could bring the scheme to bear; nor indeed could he in any degree conciliate the affection of his subjects. He died of a fever and dysentery in the year 1322, the 28th of his age, and 6th of his reign.

58
Reign of Charles the Fair. By the death of Philip, the crown of France devolved on his brother Charles IV. who had obtained the surname of *Fair*. After settling some disputes with the duke of Burgundy, his next step was to dissolve his marriage with Blanch, who still continued in prison, and to espouse Mary the daughter of Henry emperor of Germany. This marriage was contracted with a view to the imperial crown itself, which had been so long separated from that of France; and in 1325 an opportunity offered for Charles to gratify his ambition. At that time the Imperial dignity was disputed between Louis of Bavaria and Frederic of Austria; the latter of whom had been taken prisoner in a battle with Louis. But pope John, who entertained an implacable hatred against Louis, fulminated the sentence of excommunication against him, intrusting the execution of it to Leopold the brother of Ferdinand. The king of France was induced to embark in the same cause, by a promise of the spoils of Bavaria; while Frederic himself consented to relinquish his pretensions to the empire which he had so unsuccessfully maintained. Louis, however, by instantly releasing his prisoner, and dismissing him in an honourable manner, engaged his friendship, and disarmed his most formidable antagonist. But the pope was not to be so disappointed. A considerable sum of money induced Leopold to persevere in his hostilities, while it was determined that a new council of electors should be held in order to transfer the Imperial crown to Charles. In pursuit of this visionary scheme the king of France set out for the frontiers of Germany with a splendid army; but soon found that there was no possibility of accomplishing his wishes. Leopold alone, from motives of interest, remained his friend; the rest showed the greatest indifference; and even his brother-in-law the king of Bohemia absented himself from the diet; while in a short time the death of the queen put an end to all connections with that crown.

On the decease of Mary, Charles espoused Joanna daughter to the count of Evreux: and in order to avert the calamities to be feared from an infant succession, he entered into an alliance with Robert king of Scotland; by which it was provided, that should either of the sovereigns die without an heir apparent, the states of the kingdom should fill the vacant throne, and the survivor of the two kings should with his whole force support the legality of the nomination against any other competitor: though even this proved insufficient to avert the danger which now threatened the kingdom, as shall be explained in the sequel.

59
Candidates for the regency and kingdom on the death of Charles. Charles died in the year 1328, in the 34th year of his age, leaving his queen pregnant; and as the succession depended on the fruit of the queen's pregnancy, a regent in the mean time was necessary; and two candidates instantly appeared for this important post, urging at the same time their right to the crown as well as to the regency. These were, Philip de Valois, cousin-german to the deceased king; the other, Edward III. king of England, who aspired to the throne

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France. in right of his mother, and the nephew of Charles the Fair. His pretensions, however, were easily set aside, and Philip was confirmed in the regency; from which he soon after stepped into the throne, on the queen being delivered of a daughter; from which circumstance he acquired the surname of *Fortunate*. But though the pretensions of Edward, both to the regency and crown, were unanimously rejected by the people, it was still impossible for Philip to think of the claims of such a formidable rival without uneasiness. He therefore summoned the English monarch to do homage for his possessions in France; and, upon his not answering his summons, forfeited them, and seized his revenues. This at last induced Edward to cross the sea and pay his homage; which Philip consented to receive in any form, upon condition of a proper explanation being afterwards given: but as this was studiously delayed after the return of the king of England, the province of Guienne was again seized by the French monarch. Edward, unwilling to lose his continental dominions, or involve himself in a war for the sake of a mere ceremony, sent over a formal deed, by which he acknowledged that he owed liege homage to France. Thus the flame was smothered for the present; and would perhaps have been entirely extinguished, had it not been for the intrigues of Robert of Artois, brother-in-law to the king of France himself, who had been expelled his country, and had taken refuge in England. By him he was persuaded to renew his pretensions to the crown of France, which of necessity produced a war.

For some time, indeed, neither party made any open declaration of hostility; but as both monarchs were possessed of great prudence and sagacity, they soon penetrated each other's designs. Philip, under pretence of taking the cross, began to make prodigious armaments, strengthening himself at the same time by alliances on every side; while Edward, determining to renew his claim to the crown of France, projected the conquest of Scotland. This, however, he could not accomplish; and in the mean time Philip, in order to favour the Scots, with whom he was in alliance, suffered his subjects to make irruptions into Guienne.

In 1337, the war broke out openly. Philip having detached a squadron of his fleet against the Infidels, employed the rest, consisting chiefly of Genoese vessels, against the English. As in this war it was of great importance which side was taken by the Flemings, these people were courted by both parties. Louis count of Flanders declared for Philip, but his subjects were more inclined to king Edward. James Arteville a brewer, the most able and artful man in the country, governed them at that time as much as if he had been their prince; and the advantages arising from the English commerce determining him in favour of Edward, that prince, at his request, embarked for Sluys with a numerous army. Here he arrived in 1338; and on his first landing, it was resolved that the German princes in alliance with him should act against France. But for this a pretence was wanting. The vassals of the empire could not act by Edward's orders, or even as his allies, without directions from the emperor, and he was in league with France. This difficulty, however, was soon overcome: the French had made themselves masters of Cambray, and the emperor resolved

that

60
Disputes with Edward III. of England.

61
Edward's first expedition.

France.

that it should be retaken. With this view he created Edward *Vicar General of the Empire*; an empty title, but which seemed to give him a right of commanding the services of the princes of Germany. The Flemings, who were vassals of France, likewise pretended scruples at invading the territories of their liege lord. To quiet these, Edward, by the advice of Arteville, assumed the title of *King of France*; and by virtue of this right challenged their assistance for dethroning Philip de Valois, the usurper of his kingdom. This step, which he feared would beget endless animosities and jealousies, he did not take without hesitation; and, according to Mr Hume, from this time we may date the commencement of that great animosity which the English have always borne to the French.

Edward's first attempt was upon the city of Cambray, to which he laid siege; but in a short time he was prevailed upon by Robert d'Artois to raise the siege and march into Picardy. This country he entered with an army of near 50,000 men, composed mostly of foreigners. Philip came within sight of him with an army of near 100,000, composed chiefly of native subjects; and it was daily expected that a battle would ensue. But the English monarch was averse to engage against so great a superiority; and Philip thought it sufficient if he eluded the attacks of his enemy, without running any unnecessary hazard. The two armies faced each other for several days; mutual defiance was sent; and Edward at last retired into Flanders, and dispersed his army.

Such was the fruitless, and almost ridiculous conclusion of Edward's first expedition, which had plunged him into the greatest difficulties. He had contracted near L. 300,000 of debt; he had anticipated all his revenue; he had pawned every thing of value which belonged either to himself or his queen; nay, he was obliged in some measure even to pawn himself to his creditors, by desiring their permission to go over to England in order to procure supply, and by promising on his word of honour to return in person if he did not remit their money. On his arrival in England, however, he procured a large supply, sufficient to enable him to make all the necessary preparations for a new invasion; and so certain were the English that France would now be conquered, that the parliament, before Edward's departure, protested that they owed him no obedience as king of France, but that the two kingdoms must remain for ever distinct and independent.

62
his second
expedition.

63
the French
entirely de-
feated at
Ca.

The king of England set out on his second expedition with a fleet of 240 vessels. Philip had prepared a fleet of 400 vessels, manned with 40,000 men; which he stationed off Sluys, in order to intercept him in his passage. The two fleets met on the 13th of June 1340; but the English, either by the superior abilities of Edward, or the greater dexterity of his seamen, gained the wind of the enemy, and had the sun in their backs; and with these advantages began the action. The battle was fierce and bloody: the English archers, whose force and address were now much celebrated, galled the French on their approach; and when the ships grappled together, the example of the king and the nobility who were with him so animated the seamen and soldiers, that they maintained every where a superiority over the enemy. The Flemings observing the battle, hurried out of their ports, and

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brought a reinforcement to the English; which coming unexpectedly, had a greater effect than in proportion to its power and numbers. Two hundred and thirty ships were taken; and 30,000 Frenchmen were killed, with two of their admirals: the loss of the English was inconsiderable, compared to the greatness and importance of the victory. None of Philip's courtiers, it is said, dared to inform him of the event; till his fool or jester gave him a hint, by which he discovered the loss he had sustained.

After this great victory, Edward landed his forces, and laid siege to Tournay. Philip marched to its relief with a very numerous army; but acted with so much caution, that Edward found himself in a manner blocked up in his camp: and the countess dowager of Hainault, sister to Philip, mother-in-law to Edward, and sister-in-law to Robert d'Artois, coming out of a convent, to which she had retired, interposed with so much spirit and address, that she engaged all parties to agree to a truce for a year, and might perhaps have brought about a peace if she had survived.

In 1341, however, Edward's ambition was more excited by the invitation of the count de Mountfort, who had possessed himself of the province of Brittany, and applied to Edward to second his claims. An offer of this kind entirely coincided with Edward's most sanguine desires. He was happy in the promised assistance of Mountfort, an active and valiant prince, closely united to him by interest, and thus opening to him an entrance into the heart of France. These flattering prospects, however, were for a while damped by the imprisonment of Mountfort; whose aims being discovered, he was besieged in the city of Nantz and taken. But Jane of Flanders his wife soon made up for the loss of her husband. This lady courageously undertook to support the falling fortunes of her family. She assembled the inhabitants of Rennes, where she then resided; and carrying her infant son in her arms, deplored her misfortunes, and attempted to inspire the citizens with an affection for her cause. The inhabitants of Nantz instantly espoused her interests, and all the other fortresses of Brittany embraced the same resolution. The king of England was apprised of her efforts; and was intreated to send her succours with all possible expedition to the town of Hennebone, in which place she resolved to sustain the attacks of the enemy. Charles de Blois, Philip's general, anxious to make himself master of so important a fortress as Hennebone, and still more to take the countess a prisoner, sat down before the place with a large army, and conducted the siege with indefatigable industry. The defence was no less vigorous: several sallies were made by the garrison, in which the countess herself was still the most active, and led on to the assault. Observing one day that their whole army had quitted the camp to join in a general storm, she sallied out by a postern at the head of 300 horse, set fire to the enemies tents and baggage, put their sutlers and servants to the sword, and occasioned such an alarm, that the French desisted from the assault, in order to cut off her communication with the town. Thus intercepted, she retired to Auray, where she continued five or six days; then returning at the head of 500 horse, she fought her way through one quarter of the French camp, and returned to her faithful citizens in triumph. But the besiegers had at

France.

64
Edward in-
vited into
France a
third time.

3 F

length

France. length made several breaches in the walls; and it was apprehended that a general assault, which was hourly expected, would be fatal. A capitulation was therefore proposed, and a conference was already begun, when the countess, who had mounted on a high tower, and was looking towards the sea with great impatience, descried some ships at a distance. She immediately exclaimed that succours were arrived, and forbid any further capitulation. She was not disappointed in her wishes; the fleet she discerned carried a body of English gentlemen, with 6000 archers, whom Edward had prepared for the relief of Hennebone, but who had been long detained by contrary winds. They entered the harbour under the conduct of Sir Walter Manny, one of the most valiant commanders of his time. This relief served to keep up the declining spirits of the Bretons until the time appointed by the late truce with Edward was expired, on which he was at liberty to renew the war in greater form.

The succours under Sir Walter Manny were quickly followed by a more considerable reinforcement commanded by Robert of Artois, who made himself master of the city of Vannes soon after his arrival: but the Bretons soon recovered the city, and Robert was compelled to relinquish his prize after receiving a mortal wound. Edward himself, eager to revenge the death of his ally, soon landed at Morbion near Vannes with an army of 12,000 men. With this small number he undertook at once the siege of Vannes, Nantz, and Rennes: but by dividing his forces, he failed in every enterprise, and gave an opportunity to John duke of Normandy, the king of France's eldest son, to invest him in his camp. In this situation his provisions soon began to fail; and Edward, notwithstanding all his valour, would have been obliged to surrender, had he not, by a train of artful negotiations, induced Philip to relinquish the advantage he had obtained, and consent to a truce of three years. This was accomplished by the mediation of the court of Rome; and the French monarch was soon made sensible of the partiality of that court, and the imprudence of the step he himself had taken. Edward soon found a pretence to renew the war, from the execution of some nobles of Brittany, who, he said, were partisans of Mountfort, and chose to look upon their punishment as an infraction of the treaty.

Philip now endeavoured to secure himself against the power of his rival by alliances, and by purchasing the city of Montpellier from the king of Majorca: but in the mean time, the English, under the command of the earl of Darby, had invaded Guienne, twice defeated the French army commanded by the Count de Lisle, and made themselves masters of a great number of towns. Philip, by reason of the exhausted state of his treasury, was for some time incapable of making any opposition. To recruit his finances, he was obliged to lay a duty on salt; which gave such offence to his subjects as had almost excited a rebellion. When these discontents were assuaged, however, he soon raised an army of 100,000 men, whose courage was further raised by the presence of the dukes of Normandy and Burgundy. The English general was therefore compelled to stand upon the defensive. One fortress after another was surrendered to the French; till at length nothing appeared but a total extinction of the power

of England upon the continent. In this situation, Edward resolved to bring relief in person to his distressed subjects and allies; and accordingly embarked in 1346 at Southampton, on board a fleet of near 1000 sail, of all dimensions. He carried with him, besides all the chief nobility of England, his eldest son the prince of Wales (afterwards surnamed the *Black Prince*); a youth of about 15 years old, and already remarkable both for understanding and valour above his age. His army consisted of 4000 men at arms, 10,000 archers, 10,000 Welsh infantry, and 6000 Irish; all which he landed safely at La Hogue, a port in Normandy, which country he determined to make the seat of the war.

The intelligence of Edward's landing, and the devastation caused by his troops, who dispersed themselves over the whole face of the country, soon spread universal consternation through the French court. The rich city of Caen was taken and plundered by the English without mercy; the villages and towns, even up to Paris, shared the same fate; and the French had no other resource but by breaking down their bridges, to attempt putting a stop to the invader's career. In the mean time, Philip was not idle in making preparations to repress the enemy. He had stationed one of his generals, Godemar de Faye, with an army on the opposite side of the river Somme, over which Edward was to pass; while he himself, at the head of 120,000 fighting men, advanced to give the English battle. Edward, thus unexpectedly exposed to the danger of being inclosed and starved in an enemy's country, published a reward to any that should bring him intelligence of a passage over the river Somme. This was discovered by a peasant of the country named Gobin Agace; and Edward had just time to get his whole army over the river, when Philip appeared in his rear. Of the battle that ensued, in which the French were overthrown with great slaughter, an account is given under the article CRESSY.

Edward next laid siege to Calais, which was then defended by John di Vienne, an experienced commander, and supplied with every thing necessary for defence. It was at length taken, after a twelvemonth's siege, the defendants having been reduced to the last extremity by famine and fatigue; for the consequences of which, see the article CALAIS.

From the very beginning of this unfortunate war, Philip had invariably showed himself desirous of peace, and the victory of Cressy rendered him still more so. Edward also, notwithstanding his successes, was unable to support the expences of the war any longer. The mediation of the court of Rome was therefore readily accepted, and a truce for three years concluded. At the same time, Philip met with some recompence for the losses he had sustained, by the acquisition of Dauphiny, which has ever since given the title of *Dauphin* to the eldest son of the king of France. It was obtained by the resignation of Humbert prince of Dauphiny; who, being disappointed in his hopes of marrying Joan, daughter of the duke of Bourbon, gave up his territories to Charles the grandson of Philip, who had married that lady; himself retiring into a convent. Soon after this event, the king himself, who had been some time a widower, was married to Blanch, the daughter of Philip count of Evreux, and Jane queen of Navarre; and his son

France.

65
He lands
with an army
in Normandy.

66
Calais taken.

France.

67
Death of
king Phi-
lip.

son John to the countess of Boulogne. But the happiness occasioned by these marriages was soon interrupted by the death of the king; who expired in the year 1350, the 57th of his age, and 23d of his reign.

On the death of Philip, his eldest son John took possession of the kingdom; but scarcely was he seated on the throne, when he disgusted his nobility by an unseasonable act of severity. Robert de Brienné, count of Eu and Guisness, had been taken prisoner by the king of England at Caen; and under pretence of negotiating his ransom, had passed several times between France and England; but being accused of a treasonable correspondence with Edward, he was by order of his sovereign suddenly arrested, condemned, and beheaded, without any form of trial. At his death, it is said, that he confessed his treasonable practices; but this has not been authenticated by any historian of credit. Having been constable of France, the sword, the badge of his office, was delivered to Charles de la Carda: but his fate was equally unfortunate with that of his predecessor, being soon after assassinated by Charles king of Navarre, surnamed *The Wicked*. This prince, celebrated for his personal qualifications, but detested for his crimes, was the son-in-law of John himself. He had demanded the duchy of Angouleme of the king; but as the latter had thought proper to bestow it upon Carda, he had taken the effectual method of revenging himself by assassinating his rival. John did not fail to show a proper resentment; but such was the weakness of his government, that the king of Navarre set him at defiance, and would not even condescend to the ceremony of asking pardon until John had sent him his second son as an hostage for his personal security. To these offences the king of Navarre added another still more atrocious, viz. that of aspiring to the crown of France itself; to which he pretended a right derived from his mother, being grandson by the female side to Louis the Boisterous. But his more immediate demands were the countries of Champagne and Brie. To obviate all difficulties on this head, however, John bestowed the duchy of Normandy on his eldest son Charles; and commanded him to seize the estates of the king of Navarre. On this the latter soon made his appearance at Paris; but John found himself obliged to appease his murmurs at the expence of no less than 100,000 crowns.

All this time the truce with England had been very ill observed on both sides; the French had possessed themselves of the port of St Jean d'Angeli; and the English had surprised the town of Guisness. The rival houses of Mountfort and Blois still continued their animosities; while Edward continued to threaten war. The king of Navarre went on with his intrigues; and even the dauphin was drawn into a confederacy against his father. John, however, being informed of their machinations, found means to defeat them effectually. The dauphin was reclaimed by pointing out to him the impropriety of his conduct, and the disadvantage which must unavoidably accrue to himself from the connections which he had formed. The king of Navarre was invited, with his principal adherents, to an entertainment, where they were unexpectedly arrested; the former being sent prisoner to Chateau Gaillard, and several of the most obnoxious of the latter put to death. The rest of the conspira-

tors, instead of being disinayed by this check, immediately showed themselves in open rebellion; and finding themselves unable, without farther assistance, to gain their point, they without delay invited over Edward from England.

That warlike and enterprising monarch had never lost sight of the object he had originally embraced; and on the expiration of the truce had sent his son, prince of Wales, and, from the colour of his armour, surnamed the *Black Prince*, with a fleet towards the coast of France. Young Edward had with this fleet entered the mouth of the river Garonne, burnt the towns and villages of Languedoc, and retired with the plunder into the country of Guienne. Edward himself, who had likewise passed over to the continent, wasted the country as far as St Omer; but the French king, notwithstanding all these provocations, determined to avoid a battle, and therefore prohibited his general, the constable of Bourbon, from coming to an engagement though his army was much superior to that of the prince of Wales. With the flower of his troops, however, he pursued Edward from St Omer to Hesdin, where he defied him to a pitched battle; but the latter, without minding his bravadoes, continued his march to Calais, from whence he embarked for England. After his departure, John called an assembly of the states at Paris, where he explained the distressed situation of his finances, and showed so fully the necessity of assisting him in the defence of the kingdom, that they consented to maintain an army of 30,000 men during the war. To supply the other exigencies of government, they revived the duty on salt, and added a variety of other imposts; but at the same time appointed a committee of their own number to take care that the money was solely appropriated to the public service.

The satisfaction which John received from these grants, and the suppression of some disturbances which happened about this time, was soon overcast by the news that the prince of Wales had marched with an army of 12,000 men from Bourdeaux; and, after ravaging the Agenois, Quercy, and the Limousin, had entered the province of Berry. The young warrior had penetrated into the heart of France with this trifling body of forces, in hopes of joining the duke of Lancaster in Guienne. But he soon found that his scheme was impracticable: the country before him was too well guarded to permit his advancing further; and all the bridges behind were broken down, which effectually barred a retreat. In this embarrassing situation, his perplexity was increased, by being informed, that the king of France was actually marching at the head of 60,000 men to intercept him. He at first thought of retreating: but soon finding it impossible, he determined calmly to await the approach of the enemy; and, notwithstanding the disparity of forces, to commit all to the hazard of a battle.

It was at a place called *Maupertuis*, near Poitiers, that both armies came in sight of each other. The French king might very easily have starved the English into any terms he thought proper to impose; but such was the impatient valour of the French nobility, and such their certainty of success, that it might have been equally fatal to attempt repressing their ardour to engage. In the mean time, while both armies were

France.

70

France again
invaded by Ed-
ward.

71

Battle of
Poitiers.69
He is taken
and confined.

France.

drawn out, and expecting the signal to begin, they were stopped by the appearance of the cardinal of Perigord, who attempted to be a mediator between them. However, John, who made himself sure of victory, would listen to no other terms than the restitution of Calais; with which the Black Prince refusing to comply, the onset was deferred till the next morning, for which both sides waited in anxious suspense.

72
French de-
feated.

73
King John
taken pri-
soner.

74
Miserable
situation of
France.

During this interval, the young prince strengthened his post by new entrenchments; and placed 300 men in ambush, with as many archers, who were commanded to attack the enemy in flank during the heat of the engagement. Having taken these precautions, he ranged his army in three divisions; the van was commanded by the earl of Warwick, the rear by the earls of Salisbury and Suffolk, and the main body by himself. In like manner, the king of France arranged his forces in three divisions; the first commanded by the duke of Orleans; the second by the Dauphin, attended by his younger brothers; while he himself led up the main body, seconded by his youngest and favourite son, then about 14 years of age. As the English were to be attacked only by marching up a long narrow lane, the French suffered greatly from their archers, who were posted on each side, behind the hedges. Nor were they in a better situation upon emerging from this danger, being met by the Black Prince himself at the head of a chosen body of troops, who made a furious onset upon their forces, already in great disorder. A dreadful overthrow ensued: those who were as yet in the lane recoiled upon their own forces; while the English troops who had been placed in ambush, took that opportunity to increase the confusion, and confirm the victory. The dauphin and the duke of Orleans were among the first that fled. The king of France himself made the utmost efforts to retrieve, by his valour, what his rashness had forfeited: but his single courage was unable to stop that conflagration which had now become general through his army; and his cavalry soon flying, he found himself exposed to the enemy's fury. At length, spent with fatigue, and despairing of success, he thought of yielding himself a prisoner; and frequently cried out, that he was ready to deliver himself to his cousin the prince of Wales. The honour of taking him, however, was reserved for a much more ignoble hand; he was seized by Dennis de Morbec, a knight of Arras, who had been obliged to fly his country for murder.

In April following, the prince conducted his royal prisoner through London, attended by an infinite concourse of people of all ranks and stations. His modesty upon this occasion was very remarkable: the king of France was clad in royal apparel, and mounted on a white steed distinguished by its size and beauty; while the prince himself rode by his side upon a mean little horse, and in very plain attire.

This dreadful defeat, which happened in the year 1356, almost entirely ruined the French affairs; and the miseries which ensued from this cause were greatly augmented by intestine commotions. The dauphin, who had now assumed the government, was altogether unable to govern a turbulent and seditious people at such a crisis. An assembly of the states, which he called, took the opportunity to limit the power of the prince, impeach the former ministers, and demand the

France.

liberty of the king of Navarre; the treasurer of the crown was murdered by one Marcel, a partizan of that worthless prince, who had filled the city of Paris with confusion by his intrigues. The assassin whom Marcel employed was dragged, by order of the dauphin, from an altar where he had taken refuge, and instantly put to death. The bishop of Paris resented the indignity done to the church; and Marcel avenged the fate of his adherent by murdering both the marshals, who had seized him in the presence of the dauphin; and so near him, that his clothes were stained with their blood. The prince indignantly asked him, if he was to be involved in the same destruction? when Marcel affected to provide for his safety by putting upon him a blue hood, the badge of the adherents of Navarre. The public disorders were now also augmented by the escape of the king of Navarre from confinement; and though the dauphin was even assured that he had administered a dose of poison to him, he was obliged still to pay him some appearance of regard. A scheme was even formed by the chiefs of the sedition to change the government, to vest all the power in the commons, and leave the king no more than an empty title; but though this was favourably received by the city of Paris, it was entirely rejected by the other cities of the kingdom. The dauphin was likewise recognised as regent by the states general, and the inhabitants of Picardy and Champagne took up arms in his cause.

75
The king
of Navarre
escapes
from pri-
son.

In this disastrous state of affairs, the miseries of the people were heightened by a new and unexpected evil. The peasants, who had been all along oppressed by the nobles, were now treated in such a manner, that they rose in great numbers to revenge themselves; the castles of the nobility were rased to the ground, their wives and daughters ravished, and themselves put to the most cruel torments. At last they were obliged to arm in their own defence. The duke of Orleans cut off 10,000 of them in the neighbourhood of Paris; 12,000 were massacred by the king of Navarre; 9000, who had laid siege to the town of Meaux, where the dauphiness and three other ladies of the first rank resided, were routed and pursued with dreadful slaughter by an officer in the service of Edward. Amidst these confusions, Marcel, the seditious leader already mentioned, perished in a tumult of his own raising; and the most virtuous and prudent people of the nation supported the pretensions of the dauphin. His most dangerous enemy was the king of Navarre, who had allured to his standard numbers of those Norman and English adventurers who had followed Edward into France, and there been left to seek their fortunes; where they associated themselves under the name of the

76
Insurrec-
tions and tu-
mults of
the pea-
sants.

77
Peace be-
tween the
dauphin
and king of
Navarre.

Companions. By such a formidable competitor the dauphin was reduced almost to the last extremity, when his hopes were revived by an unexpected proposal from his rival, of peace upon equitable and moderate terms. Historians in general have ascribed this to the natural levity of the king of Navarre; but some have been of opinion that he acted from prudential motives, and that he justly supposed it would be more easy to deal with the dauphin, who was his own kinsman, and humbled by so many misfortunes, than with an haughty and imperious conqueror like Edward.

On the expiration of the truce in 1359, Edward again set sail for France, and anchored before Calais with

France.

78
A new invasion of France by Edward.

with a fleet of 1100 sail, assumed the title of *king of France*, and augmented his army to 100,000 men. The dauphin, finding himself unable to withstand so great a power, was obliged to act on the defensive; choosing the city of Paris for his station, and allowing the English to ravage all the open country. Thus they were allowed to penetrate through Picardy into Champagne; but the city of Rheims, where Edward designed to have been crowned king of France, baffled their utmost efforts. From Champagne, therefore, which was already laid waste, the English monarch marched into Burgundy; pillaging Tonaere, Gaillon, and Avalon. Burgundy was saved by the payment of 100,000 marks, and a like sum was paid for Nivernois. At last, after a long and destructive march, Edward arrived at the gates of Paris; but the prudence of the dauphin and citizens of that metropolis had rendered it impregnable to the attacks of famine as well as the assaults of an army. Thus the war went on till the year 1360, when the king of England was inclined to peace, as is said, by a dreadful tempest, to which his army was exposed while encamped in the fields round Chartres. His conduct, however, may more reasonably be derived from other motives. Notwithstanding all the victories he had gained, the French nation showed not the least favour to his claim of succession; the king of Navarre was a dangerous rival, and the caution of the dauphin in avoiding an engagement deprived him of the advantages he might expect from his valour and military skill. Thus conferences for a peace were opened at Bretigny in the Chartraine; and it was at last concluded on the following conditions, *viz.* That king John should pay for his ransom, at different periods, three millions of crowns of gold (about a million and an half of our money); Edward should for ever renounce all claim to the kingdom of France; and should remain possessed of the territories of Poitou, Xaintonge, l'Agenois, Perigord, the Limousin, Quercy, Rouvergne, l'Angoumois, and other districts in that quarter, together with Calais, Guisnes, Montreuil, and the county of Ponthieu on the other side of France. Some other stipulations were made in favour of the allies of England, as a security for the execution of these conditions.

Upon John's return to his dominions, he found himself very ill able to ratify those terms of peace that had been just concluded. He was without finances, at the head of an exhausted state; his soldiers without discipline, and his peasants without subordination. These had risen in great numbers; and one of the chiefs of their banditti assumed the title of *The Friend of God and the Terror of Man*. A citizen of Sens, named *John Gouge*, also got himself, by means of his robberies, to be acknowledged king; and he soon caused as many calamities by his devastations, as the real king had brought on by his misfortunes. Such was the state of that wretched kingdom upon the return of its captive monarch: and yet such was his absurdity, that he immediately prepared for a croisade into the Holy Land, before he was well replaced on the throne. Had his exhausted subjects been able to equip him for this chimerical project, it is probable he would have gone through with it; but their miseries were such, that they were even too poor to pay his ransom. This was a breach of treaty that John would not submit to;

80.
John, unable to pay his ransom, returns to England.

and he was heard to express himself in a very noble manner upon the occasion: "Though (says he) good faith should be banished from the rest of the earth, yet she ought still to retain her habitation in the breast of kings." In consequence of this declaration, he actually returned to England once more; and yielded himself a prisoner, since he could not be honourably free. It is said by some, that his passion for the countess of Salisbury was the real cause of his journey: but we want at this time the foundations for such an injurious report. He was lodged in the Savoy, the palace where he had resided during his captivity; and soon after he closed a long and unfortunate reign, by his death, which happened in the year 1384, about the 56th year of his age.

Charles, surnamed *the Wise*, succeeded his father on the throne of France; and this monarch, merely by the force of a finely conducted policy, and even tho' suffering some defeats, restored his country once more to tranquillity and power. He quelled and dissipated a set of banditti, who had associated themselves under the name of *Companions*, and who had long been a terror to the peaceable inhabitants. He had them inrolled into a body, and led them into the kingdom of Castile against Peter, surnamed *the Cruel*, whom his subjects had dethroned, and who, by means of an alliance with the English, endeavoured to get himself re-instated upon the throne. In consequence of these alliances, the English and French again came to an engagement; their armies on the one side commanded by the Black Prince; on the other, by Henry of Transtamarre, and Bertrand du Guesclin, one of the most consummate generals and accomplished characters of the age in which he lived. However, the usual good fortune of the English prince prevailed; the French lost above 20,000 men, while only four knights and 40 private men on the side of the English were slain.

Nevertheless, these victories were attended with very few good effects. The English, by their frequent levies, had been quite exhausted, and were unable to continue an army in the field. Charles, on the other hand, cautiously forbore coming to any decisive engagement; but was contented to let his enemies waste their strength in attempts to plunder a fortified country. When they were retired, he then was sure to fall forth, and possess himself of such places as they were not strong enough to defend. He first fell upon Ponthieu; the citizens of Abbeville opened their gates to him; those of St Valois, Rue, and Crotoy, imitated the example; and the whole country was, in a little time, reduced to total submission. The southern provinces were, in the same manner, invaded by his generals with equal success: while the Black Prince, destitute of supplies from England, and wasted by a cruel and consumptive disorder, was obliged to return to his native country, leaving his affairs in the south of France in a desperate condition.

In this exigence, the resentment of the king of England was excited to the utmost pitch; and he seemed resolved to take signal vengeance on his enemies of the continent. But the fortunate occasion was now elapsed; and all his succeeding designs were marked with ill success. The earl of Pembroke and his whole army were intercepted at sea, and taken prisoners by Henry king of Castile. Sir Robert Knolles, one of

France.

81

Dies, and is succeeded by Charles the Wise.

82

Bad success of the English.

his.

France.

his generals on the continent, at the head of 30,000 men, was defeated by Bertrand du Guesclin; while the duke of Lancaster, at the head of 25,000 men, had the mortification of seeing his troops diminished one half by flying parties, without ever coming to a battle.

At last, the English affairs were totally ruined by the death of the Black Prince and king Edward. On receiving this news, the armies of Charles attacked the English on all sides. One, under the command of the duke of Burgundy, entered Artois; another entered Auvergne, under the command of the duke of Berry; that which acted in Guienne was commanded by the duke of Anjou; and the forces in Bretagne were under the constable Guesclin: the king himself had a powerful body of troops, that he might be able to repair any accident which should happen through the chance of war. The constable joined the duke of Burgundy, who found it difficult to oppose Sir Thomas Felton and the Seneschal of Bourdeaux. Soon after his arrival, the constable attacked and defeated them, making both the commanders prisoners of war. This victory was so well pursued, that, at the close of the campaign 1377, Bayonne and Bourdeaux, with the districts about them, and the fortrefs of Calais with its dependencies, were all the places left to England on the continent.

83
Death of
Charles;

Thus Charles established once more the house of Valois on the throne of France, but did not long live to enjoy his good fortune. He died in the year 1379, at the age of 44, of the consequences of poison formerly given him by the king of Navarre, as has already been mentioned. The immediate operation of this poison had been suspended by the skill of a physician sent by the emperor Charles IV. He opened an issue in his arm, the running of which preserved his life; but the physician declared, that whenever it should dry, up the consequence would be fatal. Not long before his death, Charles had commenced a process against the king of Navarre for this crime. Several of the associates of the latter suffered on this occasion, and the king himself was deprived of his possessions in Normandy, as well as his lordship of Montpellier, which had been given him in lieu of the counties of Champagne and Brie, and the duchy of Burgundy which he had claimed. He did not long survive the death of the French monarch whom he destroyed. His death was singular and very terrible; for having been afflicted with the leprosy, he had been obliged to make use of some bandages dipped in sulphur and afterwards steeped in brandy. These took fire by the carelessness of a page, and the unfortunate prince was burnt to death.

85
Reign of
Charles VI

Charles V. was succeeded by his son Charles VI. surnamed the *Well-beloved*, who at the time of his accession to the throne was only 12 years of age. The duke of Anjou, eldest brother to the late king, had been appointed guardian during the minority of the prince; but he being totally unfit for the office, and distinguished only for his rapacity and ambition, readily resigned his charge to the dukes of Burgundy and Bourbon, the former uncle to the king by his father's side, the latter by his mother's. None of these tutors, however, proved faithful to the trust reposed in them. The duke of Anjou seized the plate and treasures of the

late king, in order to support his ambitious enterprises. At that time Joan, infamous for her profligacy, reigned in Naples. She had appointed one Charles Durazzo, who was her relation, to succeed her in the throne; but the inhuman wretch murdered his benefactress, who with her last breath revoked her grant of the kingdom to him, and bestowed it upon the duke of Anjou. His influence at the French court enabled him to waste the treasures of the kingdom in support of his pretensions; though he proved ultimately unsuccessful, his forces being constantly defeated, and his designs frustrated by the superior skill of his adversary. The duke of Burgundy, instead of instructing his pupil in the ways of virtue, indulged him in every kind of vicious pleasure, hoping thereby to gain his favour afterwards. The citizens of Paris, oppressed by taxes, broke out into tumults, and were quelled with difficulty; while the mal-administration of Philip the duke of Burgundy soon involved the nation in hostilities with the Flemings. Philip invaded their country at the head of an army of 80,000 men, along with whom was the young king, accompanied by the principal nobility of France. The first operations of war were favourable to the Flemings; but they were at length totally defeated on the banks of the river Lis, where their leader, with 25,000 of his followers, perished. This victory was followed by the submission of the whole country; but the satisfaction of the king at this event was disturbed by new seditions and revolts in the city of Paris, and other great towns of the kingdom. His return, however, at the head of a victorious army, soon reduced them to their duty, and several of the revolted cities were severely punished; at the same time that the death of the duke of Anjou having freed him from the immediate dependence on his tutors, he assumed the reins of government into his own hands in the year 1384.

The genius which Charles began to display in his early years, raised the hopes of the nation; but these were soon overcast, and greater misfortunes than ever were now about to ensue. The young king, whose marriage began to be a subject of attention to the council, refused to comply with the forms in use among his predecessors, and insisted upon seeing the person designed for his consort. An interview was accordingly contrived betwixt him and Isabella daughter to the duke of Bavaria; where he fell in love with that princess, and afterwards married her. His administration was for some time prudent and vigorous. He conciliated the affections of his people by restoring their privileges, punishing their oppressors, and relieving them from the taxes which had been imposed in his minority. He reduced the Flemings to submit to the authority of his uncle the duke of Burgundy; detached 15,000 archers and 1500 men at arms to assist the Scots in their incursions into England; and in 1385 fitted out a prodigious armament against England. A vast fleet was assembled in the harbour of Sluys, and a very numerous army in the neighbourhood. According to some writers, the armament consisted of 1200 ships, 20,000 foot differently armed, 20,000 cavalry, and 20,000 cross-bow men. There was besides a vast wooden edifice or floating town, which was contrived for the protection of the soldiers when landed: but all these preparations were at last

France.

86
Flanders
invaded.

87
Marries
Isabella
daughter to
the duke of
Bavaria.

France.

brought to nothing through the obstinacy of the duke of Berry; who, having been originally against this measure, carried on his part of the armament so slowly, that he did not arrive at Sluys till the middle of September, when the season was so far advanced, that no invasion was practicable. A storm that happened soon after, drove the greatest part of the fleet on shore, and beat the wooden edifice all to pieces; the remains of which the king bestowed on the duke of Burgundy, to whom he gave also the port of Sluys, which was then very commodious, and of the utmost importance.

The destruction of the French fleet was only a prelude to calamities of a more extraordinary nature. The Sieur de Craon, a profligate nobleman, had been entrusted by the court of France with a considerable sum of money for the support of the duke of Anjou, at the time he was reduced to distress by his Italian expedition. This money he had dissipated at Venice; but, by the credit of the duke of Orleans, the king's brother, he had obtained his pardon, and returned to court. Here he attempted to gratify his private resentment by the assassination of Oliver Clifton the constable, whom he suspected of having promoted his disgrace. This veteran hero was attacked, on his return from the hotel de St Pol, by a band of 20 ruffians, against whom he defended himself with wonderful intrepidity, when at last he fell, after receiving more than 50 wounds. Happily, however, he recovered notwithstanding his being mangled in this manner; while the assassin, to screen himself from vengeance, fled for protection to the duke of Brittany. The king demanded the assassin to be given up to him in chains; but the duke answered, that he knew nothing of him: to which the king giving no credit, marched with all his forces into his territories. When the army arrived at Mans, the king was seized with a slow fever; but could not be prevailed upon to rest or take physic. On the 5th of August 1391, having marched all day in the heat of the sun, a miserable, ragged, wild-looking fellow, darted from behind a tree, and laying hold of the bridle of his horse, cried out, "Stop! where are you going, king? You are betrayed;" and immediately withdrew again into the wood. The king passed on, not a little disturbed; and soon after one of the pages, who rode behind and carried his lance, overcome with heat, fell asleep, and let it fall upon the helmet which was carried by the other. The king, hearing the noise, looked about; and perceiving the page lifting the lance, killed him immediately: then riding furiously with his sword drawn, he struck on every side of him, and at every person, till he broke his sword; upon which one of his gentlemen leaped up behind him and held his arm. He fell soon after, and lay as if he had been dead; so that being taken up and bound in a waggon, he was carried back to Mans, where he lay two days in a lethargy, after which he came a little to himself, and expressed great concern at the blood he had shed in his delirium. The people, who had expressed the greatest concern for his distemper, were equally rejoiced at the news of his recovery; but unfortunately it was soon discovered, that he no longer possessed that strength of judgment and understanding for which he had formerly been remarkable. Hence a regency became indispensably necessary;

and the competition for it brought to light the characters of the queen and duke of Orleans, which had not hitherto been displayed to public view. The former of these was a most beautiful and accomplished princess; but vindictive, violent, and intriguing; insensible to natural affection, but easily accessible to flattery, and ready to yield to every impulse of lawless passion. The duke of Orleans was equally remarkable for his personal accomplishments, and had married Valentina daughter of the duke of Milan; but his engagements with that princess did not prevent him from engaging in a number of licentious amours, and among the rest, as was supposed, with his sister-in-law Isabella. During the king's illness he openly aspired at the regency; but his pretensions were over-ruled by the states, the administration of affairs being for the present conferred on the duke of Burgundy. In a few months indeed the health and understanding of the king seemed to be sufficiently restored; but in the year 1393 it was again disturbed by an accident no less extraordinary than the former had been. An entertainment had been given in honour of the marriage of one of the queen's attendants. At this six masques entered the apartment, disguised like satyrs, in linen clothes covered with rosin, and while warm stuck over with down. These were the king and five of his lords. The duchess of Berri paid attention to the king though she did not know him, and engaged in conversation with him. In the mean time the duke of Orleans, ignorant of the consequence, out of diversion ran a lighted torch against one of them. His whole dress was instantly in a flame, and the fire was from him communicated to all the rest. The masques, notwithstanding the dreadful situation they were in, called out, "Save the king; save the king!" On which the duchess of Berri, recollecting that it must be him with whom she had engaged in conversation, wrapped him in her cloak, and preserved him from farther danger. Only one of the rest escaped by jumping into a cistern of water; the other four perished in the flames. The terror which the king underwent by this accident instantly occasioned a relapse; and he continued delirious at intervals as long as he lived. During this state of insanity he was intractable by every person except Valentina duchess of Orleans; who seemed to have as great an influence over him as her husband the duke had over the mind of the queen. So great was the power indeed which she had over the king in this deplorable state, that in those superstitious times it was supposed by many to be the effect of magic. Others, with more probability, ascribed it to her superior charms as a woman; and this idea instantly produced her a number of enemies among her own sex. The duchess of Burgundy, particularly, by her hatred, and the quarrel between the two ladies, soon extended itself to their husbands. Amidst their dissensions, however, they did not entirely neglect the administration of public affairs; they strove to conciliate the affection of the parliament by preserving the rights of the commons inviolate; and they endeavoured to check an inordinate passion for gaming, which began to appear about this time, and to substitute manly and martial exercises in its place.

During the intervals of his reason, Charles frequently assumed the government into his own hands; and as the war still continued with England, though in

France.

89
Disturbances about a regency.

90
An accident occasions a relapse in the king.

88
Is seized with lunatic fits.

France. a languid manner, the French monarch, in one of these lucid intervals, had an interview with Richard king of England, in order to put an end to hostilities, of which both were equally weary. Still, however, their claims were so difficult to be adjusted, that they could do no more than conclude a truce for 25 years; during which space it was hoped that a lasting peace might take place. Richard gave up Cherbourg to Charles, and Brest to the duke of Brittany: a marriage was also concluded betwixt the king of England and Isabella the daughter of Charles, though the latter was then only seven years of age; but by reason of the tender age of the princess, this marriage was never consummated.

During this unfortunate reign, France was still farther weakened by the succours sent to the Hungarians against the Turks. On this fatal expedition upwards of 1000 of the bravest and most experienced knights were sent under the conduct of John count of Nevers, eldest son of the duke of Burgundy; the count of Eu constable of France; John de Vienne admiral of France; and the count of Marche, a prince of the blood-royal; together with De Courcy, one of the best and most experienced captains in Christendom. The prudent counsels of this veteran, however, were not obeyed by the youthful warriors by whom he was accompanied. Attacking the enemy therefore rashly, and while heated with wine, they were all either killed or taken prisoners. Notwithstanding this disaster, however, assistance was sent in the year 1400 to Wenceslaus emperor of Germany; and the duke of Orleans, who commanded the army on this occasion, acquitted himself so well that he acquired the duchy of Luxembourg for himself, and left his ally satisfied: but while the friendship of France was thus courted by foreign powers, the kingdom itself was in the most miserable situation. The king's distemper seemed daily to gain ground; while the discordant interests of the contending parties kept the whole nation in a ferment. The most violent animosity took place betwixt the dukes of Orleans and Burgundy. The former, by means of his own interest with the queen, and the ascendancy his duchess had over the king, for some time got the better of his rival, and was made lieutenant-general and governor of the kingdom; but having presumed on his power to levy new imposts on the people, and oppressing also the churchmen, whom in that superstitious age he ought by all means to have let alone, he was deprived of his authority, and obliged to yield to the duke of Burgundy. For some time, however, these powerful rivals were kept within some bounds by the mediation of the duke of Bourbon, who seems to have been the only grandee who maintained a pure and unspotted character; but by his death in 1404, the unhappy nation was left totally exposed to their relentless fury. In 1405, the queen and duke of Orleans again seized the administration; but were soon deprived of it by the unanimous voice of the people. During this period Charles and his children were neglected and abandoned to distress; but they were relieved by the duke of Burgundy on his obtaining the regency; and Isabella, with the duke of Orleans, was obliged to retire from Milan. A sudden return of the king's reason and understanding for a much longer time than usual, now deprived both parties of their power; and the ad-

ministration was vested in the queen and a council composed of princes of the blood.

The two rival dukes, thus prohibited from interfering in public affairs, exercised themselves in committing hostilities against the English, with whom the truce had been lately concluded. They were encouraged to this infraction of the treaty by the unsettled situation of the affairs of Henry IV.: but their attempts proving unsuccessful, the truce was renewed after obtaining restoration of the princess, who had been married to Richard II. as has been already mentioned. The failure of their enterprises produced a new scene of discord betwixt the dukes, who mutually threw the blame upon each other. By the intreaties of the duke of Berri they were apparently reconciled; but the duke of Burgundy pretended friendship only in order to take the more signal vengeance. To this he was now further inflamed by jealousy. Having hired a band of ruffians to execute his bloody purpose, the duke was one evening attacked by eighteen of them while attended only by two pages. A Norman gentleman whom the duke had deprived of an employment, headed the assassins, and in person attacked the duke. At the first blow he cut off his hand, at the second he struck him from his mule, and at the third put an end to his life. His wife Valentina was so concerned at his death, that she died soon after. The duke of Burgundy escaped to Flanders; and the whole nation was rent into two factions, called the *Burgundians* and *Armagnacs*; the latter being the title of the party of the duke of Orleans, from Armagnac the father-in-law of that prince. A dreadful confusion ensued: the duke of Burgundy soon returned to France, and extorted a pardon from the unhappy king, who was now no longer able to resist him: and we may have some notion of the state of the kingdom in general from being told, that 2000 people perished in one tumult in the capital. The king himself was alternately the prisoner of each party, and alternately transferred the power from the one to the other as he happened to fall into their hands. This therefore was thought by Henry V. of England a favourable opportunity to recover from France those grants that had been formerly given up by treaty. But previously, to give his intended expedition the appearance of justice, he sent over ambassadors to Paris, offering a perpetual peace and alliance, on condition of being put in possession of all those provinces which had been ravished from the English during some former reigns, and of espousing Catharine, the French king's daughter, in marriage, with a suitable dowry. Though the French court was at that time extremely averse to war, yet the exorbitance of these demands could not be complied with; and Henry very probably made them in hopes of a denial. He therefore assembled a great fleet and army at Southampton; and having allured all the military men of the kingdom to attend him, from the hopes of conquest, he put to sea, and landed at Harfleur, at the head of an army of 6000 men at arms, and 24,000 foot, mostly archers.

His first operations were upon Harfleur; which being pressed hard, promised at a certain day to surrender, unless relieved before that time. The day arriving, and the garrison, unmindful of their engagement, still resolving to defend the place, Henry ordered an

91
Interview
betwixt the
king of
France and
England.

92
Unhappy
fate of the
succours
sent to the
Hunga-
rians.

93
Violent
commo-
tions in
France.

France.

94
Duke of
Orleans as-
sassinated.

95
Invasion by
Henry V. of
England.

France.

assault to be made, took the town by storm, and put all the garrison to the sword. From thence, the victor advanced farther into the country, which had been already rendered desolate by factions, and which he now totally laid waste. But although the enemy made a feeble resistance, yet the climate seemed to fight against the English; a contagious dysentery carrying off three parts of Henry's army. In this situation he had recourse to an expedient common enough in that barbarous age, to inspire his troops with confidence in their general. He challenged the dauphin, who commanded in the French army, to single combat, offering to stake his pretensions on the event. This challenge, as might naturally be expected, was rejected; and the French, though disagreeing internally, at last seemed to unite at the appearance of the common danger. A numerous army of 14,000 men at arms, and 40,000 foot, was by this time assembled under the command of count Albert, and was now placed to intercept Henry's weakened forces on their return. The English monarch, when it was too late, began to repent of his rash inroad into a country where disease and a powerful army every where threatened destruction; he therefore thought of retiring into Calais. In this retreat, which was at once both painful and dangerous, Henry took every precaution to inspire his troops with patience and perseverance; and showed them in his own person the brightest example of fortitude and resignation. He was continually harassed on his march by flying parties of the enemy; and whenever he attempted to pass the river Somme, across which his march lay, he saw troops on the other side ready to oppose his passage. However, he was so fortunate as to seize by surprise a passage near St Quintin, which had not been sufficiently guarded; and there he safely carried over his army.

But the enemy was still resolved to intercept his retreat: and after he had passed the small river of Terrois at Blangi, he was surprised to observe from the heights the whole French army drawn up in the plains of Agincourt; and so posted, that it was impossible for him to proceed on his march, without coming to an engagement. A battle accordingly took place, in which the English gained a victory, the most remarkable perhaps of any recorded in history; an account of which is given under the article AGINCOURT.

This victory, gained on the 25th of October 1415, was however attended with no immediate effects. Henry still continued to retreat, after the battle of Agincourt, out of the kingdom; and carried his prisoners to Calais, and from thence to England. In 1517, he once more landed an army of 25,000 men in Normandy; and prepared to strike a decisive blow for the crown of France, to which the English monarchs had long made pretensions. That wretched country was now in a most deplorable situation. The whole kingdom appeared as one vast theatre of crimes, murders, injustice, and devastation. The duke of Orleans was assassinated by the duke of Burgundy; and the duke of Burgundy, in his turn, fell by the treachery of the dauphin. At the same time, the duke's son, desirous of revenging his father's death, entered into a secret treaty with the English; and a league was immediately concluded at Arras, between Henry and the young duke of Burgundy, in which the king pro-

posed to revenge the murder of the late duke; and the son seemed to insist upon no further stipulations. Henry, therefore, proceeded in his conquests without much opposition from any quarter. Several towns and provinces submitted on his approach; the city of Rouen was besieged and taken; Pontoise and Gisors he soon became master of. He even threatened Paris by the terror of his power, and obliged the court to remove to Troye. It was at this city that the duke of Burgundy, who had taken upon him the protection of the French king, met Henry in order to ratify that treaty which was formerly begun, and by which the crown of France was to be transferred to a stranger. The imbecility into which Charles had fallen, made him passive in this remarkable treaty; and Henry dictated the terms throughout the whole negotiation. The principal articles of this treaty were, That Henry should espouse the princess Catharine; that king Charles should enjoy the title and dignity of king for life; but that Henry should be declared heir to the crown, and should be intrusted with the present administration of the government; that France and England should forever be united under one king, but should still retain their respective laws and privileges; that Henry should unite his arms with those of king Charles and the duke of Burgundy, to depress and subdue the dauphin and his partisans.

It was not long after this treaty, that Henry married the princess Catharine; after which he carried his father-in-law to Paris, and took a formal possession of that capital. There he obtained, from the estates of the kingdom, a ratification of the late compact; and then turned his arms with success against the adherents of the dauphin; who, in the mean time, wandered about a stranger in his own patrimony, and to his enemies successes only opposed fruitless expostulations.

Henry's supplies were not provided in such plenty as to enable him to carry on the war, without returning in person to prevail upon his parliament for fresh succours; and, upon his arrival in England, though he found his subjects highly pleased with the splendor of his conquests, yet they seemed somewhat doubtful as to the advantage of them. A treaty, which in its consequences was likely to transfer the seat of empire from England, was not much relished by the parliament. They therefore, upon various pretences, refused him a supply equal to his exigencies or his demands; but he was resolved on pursuing his schemes; and, joining to the supplies granted at home, the contributions levied on the conquered provinces, he was able once more to assemble an army of 28,000 men, and with these he landed safely at Calais.

In the mean time, the dauphin, a prince of great prudence and activity, omitted no opportunity of repairing his ruined situation, and to take the advantage of Henry's absence from France. He prevailed upon the regent of Scotland to send him a body of 8000 men from that kingdom; and with these, and some few forces of his own, he attacked the duke of Clarence, who commanded the troops in Henry's absence, and gained a complete victory.

This was the first action which turned the tide of success against the English. But it was of short duration: for Henry soon after appearing with a considerable

France.

98

He marries
the princess
Catharine.

96
Battle of
Agincourt.

97
Henry
lands again
in Nor-
mandy.

France. able army, the dauphin fled at his approach; while many of the places, which held out for the dauphin in the neighbourhood of Paris, surrendered to the conqueror. In this manner, while Henry was every where victorious, he fixed his residence at Paris; and while Charles had a small court, he was attended with a very magnificent one. On Whitsunday 1421, the two kings and their two queens with crowns on their heads dined together in public; Charles receiving apparent homage, but Henry commanding with absolute authority.

In the mean time, the dauphin was chased beyond the Loire, and almost totally dispossessed of all the northern provinces. He was even pursued into the south, by the united arms of the English and Burgundians, and threatened with total destruction. In this exigence, he found it necessary to spin out the war, and to evade all hazardous actions with a rival who had been long accustomed to victory. His prudence was every where remarkable; and, after a train of long persecutions from fortune, he found her at length willing to declare in his favour, by the death of the king of England.

99
Death of
Henry and
Charles.

Charles VI. died a short time after; and Charles VII. succeeded his father to a nominal throne. Nothing could be more deplorable than the situation of that monarch on assuming his title to the crown. The English were masters of almost all France; and Henry VI. though yet but an infant, was solemnly invested with regal power by legates from Paris. The duke of Bedford was at the head of a numerous army, in the heart of the kingdom, ready to oppose every insurrection; while the duke of Burgundy, who had entered into a firm confederacy with him, still remained steadfast, and seconded his claims. Yet, notwithstanding these favourable appearances, Charles found means to break the leagues formed against him, and to bring back his subjects to their natural interests and their duty.

100
Desperate
situation of
Charles VI.

However, his first attempts were totally destitute of success. Wherever he endeavoured to face the enemy he was overthrown, and he could scarcely rely on the friends next his person. His authority was insulted even by his own servants; advantage after advantage was gained against him; and a battle fought near Verneuil, in which he was totally defeated by the duke of Bedford, seemed to render his affairs altogether desperate. But from the impossibility of the English keeping the field without new supplies, Bedford was obliged to retire into England; and in the mean time, his vigilant enemy began to recover from his late consternation. Dumois, one of his generals, at the head of 1000 men, compelled the earl of Warwick to raise the siege of Montargis; and this advantage, slight as it was, began to make the French suppose that the English were not invincible.

101
The French
affairs re-
trieved by
the Maid
of Orleans

But they soon had still greater reason to triumph in their change of fortune, and a new revolution was produced by means apparently the most unlikely to be attended with success. In the village of Domremi, near Vaucouleurs, on the borders of Lorraine, there lived a country-girl, about 27 years of age, called *Joan de Arc*. This girl had been a servant at a small inn; and in that humble station had submitted to those hardy employments which fit the body for the fatigues of war. She was of an irreproachable life, and had hi-

ther to testified none of those enterprising qualities which displayed themselves soon after. She contentedly fulfilled the duties of her situation, and was remarkable only for her modesty and love of religion. But the miseries of her country seemed to have been one of the greatest objects of her compassion and regard. Her mind, inflamed by these objects, and brooding with melancholy steadfastness upon them, began to feel several impulses, which she was willing to mistake for the inspirations of heaven. Convinced of the reality of her own admonitions, she had recourse to one Baudricourt, governor of Vaucouleurs, and informed him of her destination by heaven to free her native country of its fierce invaders. Baudricourt treated her at first with neglect: but her importunities at length prevailed; and willing to make a trial of her pretensions, he gave her some attendants, who conducted her to the court, which at that time resided at Chinon.

The French court were probably sensible of the weakness of her pretensions; but they were willing to make use of every artifice to support their declining fortunes. It was therefore given out, that Joan was actually inspired; that she had been able to discover the king among the number of his courtiers, although he had laid aside all the distinctions of his authority; that she had told him some secrets, which were only known to himself; and that she had demanded, and minutely described, a sword in the church of St Catharine de Fierbois, which she had never seen. In this manner, the minds of the vulgar being prepared for her appearance, she was armed cap-à-pée, and shown in that martial dress to the people. She was then brought before the doctors of the university; and they, tinged with the credulity of the times, or willing to second the imposture, declared that she had actually received her commission from above.

When the preparations for her mission were completely blazoned, the next aim was to send her against the enemy. The English were at that time besieging the city of Orleans, the last resource of Charles, and every thing promised them a speedy surrender. Joan undertook to raise the siege; and to render herself still more remarkable, girded herself with the miraculous sword, of which she before had such extraordinary notices. Thus equipped, she ordered all the soldiers to confess themselves before they set out; she displayed in her hand a consecrated banner, and assured the troops of certain success. Such confidence on her side soon raised the spirits of the French army; and even the English, who pretended to despise her efforts, felt themselves secretly influenced with the terrors of her mission. A supply of provisions was to be conveyed into the town; Joan, at the head of some French troops, covered the embarkation, and entered Orleans at the head of the convoy which she had safely protected. While she was leading her troops along, a dead silence and astonishment reigned among the English; and they regarded with religious awe that temerity, which they thought nothing but supernatural assistance could inspire. But they were soon roused from their state of amazement by a sally from the town; Joan led on the besieged, bearing the sacred standard in her hand, encouraging them with her words and actions, bringing them to the trenches, and overpowering the besiegers.

France.

France.

gers in their own redoubts. In the attack of one of the forts, she was wounded in the neck with an arrow; but instantly pulling out the weapon with her own hands, and getting the wound quickly dressed, she hastened back to head the troops, and to plant her victorious banner on the ramparts of the enemy. These successes continuing, the English found that it was impossible to resist troops animated by such superior energy; and Suffolk, who conducted the attack, thinking that it might prove extremely dangerous to remain any longer in the presence of such a courageous and victorious enemy, raised the siege, and retreated with all imaginable precaution.

From being attacked, the French now in turn became the aggressors. Charles formed a body of 6000 men, and sent them to besiege Jergeau, whither the English, commanded by the earl of Suffolk, had retired, with a detachment of his army. The city was taken; Suffolk yielded himself a prisoner; and Joan marched into the place in triumph at the head of the army. A battle was soon after fought near Patay, where the English were worsted, as before; and the generals Scales and Talbot were taken prisoners.

The raising of the siege of Orleans was one part of the maid's promise to the king of France; the crowning him at Rheims was the other. She now declared that it was time to complete that ceremony; and Charles, in pursuance of her advice, set out for Rheims at the head of 12,000 men. The towns thro' which he passed opened their gates to receive him; and Rheims sent him a deputation, with its keys, upon his approach. The ceremony of his coronation was there performed with the utmost solemnity; and the *Maid of Orleans* (for so she was now called) seeing the completion of her mission, desired leave to retire, alleging, that she had now accomplished the end of her calling. But her services had been so great, that the king could not think of parting with her; he pressed her to stay so earnestly, that she at length complied with his request.

A tide of successes followed the performance of this solemnity; Laon, Soissons, Chateau-Thierry, Provins, and many other fortresses in that neighbourhood, submitted to him on the first summons. On the other hand, the English, discomfited and dispirited, fled on every quarter; not knowing whether to ascribe their misfortunes to the power of forcery or to a celestial influence; but equally terrified at either. They now found themselves deprived of the conquests they had gained, in the same manner as the French had formerly submitted to their power. Their own divisions, both abroad and at home, unfitted them entirely for carrying on the war; and the duke of Bedford, notwithstanding all his prudence, saw himself divested of his strong-holds in the country, without being able to stop the enemy's progress. In order, therefore, to revive the declining state of his affairs, he resolved to have Henry crowned king at Paris, knowing that the natives would be allured to obedience by the splendor of the ceremony. In 1430, Henry was accordingly crowned, all the vassals that still continued under the English power swearing fealty and homage. But it was now too late for the ceremonies of a coronation to give a turn to the affairs of the English; the generality of the kingdom had declared against them, and the

remainder only waited a convenient opportunity to follow the example.

An accident ensued soon after, which, though it promised to promote the English cause in France, in the end served to render it odious, and conducted to the total evacuation of that country. The duke of Burgundy, at the head of a powerful army, had laid siege to Compeign; and the Maid of Orleans had thrown herself into the place, contrary to the wishes of the governor, who did not desire the company of one whose authority would be greater than his own. The garrison, however, were rejoiced at her appearance, and believed themselves invincible under her protection. But their joy was of short duration; for Joan having the day after her arrival headed a sally, and twice driven the enemy from their intrenchments, she was at last obliged to retire, placing herself in the rear, to protect the retreat of her forces. But in the end attempting to follow her troops into the city, she found the gates shut, and the bridge drawn up by order of the governor, who is said to have long wished for an opportunity of delivering her up to the enemy.

Nothing could exceed the joy of the besiegers, in having taken a person who had been so long a terror to their arms. The service of *Te Deum* was publicly celebrated on this occasion; and it was hoped, that the capture of this extraordinary person would restore the English to their former victories and successes. The duke of Bedford was no sooner informed of her being taken, than he purchased her of the count Vendome, who had made her his prisoner, and ordered her to be committed to close confinement. The credulity of both nations was at that time so great, that nothing was too absurd to gain belief that coincided with their passions. As Joan but a little before, from her successes, was regarded as a saint, she was now, upon her captivity, considered as a sorceress, forsaken by the demon who had granted her a fallacious and temporary assistance. Accordingly it was resolved in council to send her to Rouen to be tried for witchcraft: and the bishop of Beauvais, a man wholly devoted to the English interest, presented a petition against her for that purpose. The university of Paris was so mean as to join in the same request. Several prelates, among whom the cardinal of Winchester was the only Englishman, were appointed as her judges. They held their court in Rouen, where Henry then resided; and the Maid, clothed in her former military apparel, but loaded with irons, was produced before this tribunal. Her behaviour there noway disgraced her former gallantry; she betrayed neither weakness nor womanish submission; but appealed to God and the pope for the truth of her former revelations. In the issue, she was found guilty of heresy and witchcraft; and sentenced to be burnt alive, the common punishment for such offences.

But previous to the infliction of this dreadful sentence upon her, they were resolved to make her abjure her former errors; and at length so far prevailed upon her, by terror and rigorous treatment, that her spirits were entirely broken by the hardships she was obliged to suffer. Her former visionary dreams began to vanish, and a gloomy distrust to take place of her late inspirations. She publicly declared herself willing to recant, and promised never more to give way to the

France.

103
Maid of
Orleans
taken pri-
soner,

102
Henry VI.
of England
crowned
king of
France.

France.

vain delusions which had hitherto misled her, and imposed on the people. This was what her oppressors desired; and willing to show some appearance of mercy, they changed her sentence into perpetual imprisonment, and to be fed during life on bread and water. But the rage of her enemies was not yet satiated. Suspecting that the female dress, which she had consented to wear, was disagreeable to her, they purposely placed in her apartment a suit of mens apparel, and watched for the effect of their temptation upon her. Their cruel artifices prevailed. Joaz, struck with the sight of a dress in which she had gained so much glory, immediately threw off her penitent's robes, and put on the forbidden garment. Her enemies caught her equipped in this manner; and her imprudence was considered as a relapse into her former transgressions. No recantation would suffice, and no pardon would be granted. She was condemned to be burnt alive in the market-place of Rouen; and this infamous sentence was accordingly executed with most brutal severity.

104
And cruel-
ly put to
death.

One of the first misfortunes which the English felt after this punishment, was the defection of the duke of Burgundy; who had for some time seen the error of his conduct, and wished to break an unnatural connection, that only served to involve his country in ruin. A treaty was therefore begun and concluded between him and Charles, in which the former agreed to assist him in driving the English out of France. This was a mortal blow to their cause; and such was its effects upon the populace of London when they were informed of it, that they killed several of the duke of Burgundy's subjects, who happened to be among them at the time. It might perhaps also have hastened the duke of Bedford's death, who died at Rouen a few days after the treaty was concluded; and the earl of Cambridge was appointed his successor to the regency of France.

105
Affairs of
the English
totally ruin-
ed.

From this period, the English affairs became totally irretrievable. The city of Paris returned once more to a sense of its duty. Lord Willoughby, who commanded it for the English, was contented to stipulate for the safe retreat of his troops to Normandy. Thus ground was continually, though slowly, gained by the French; and notwithstanding their fields were laid waste, and their towns depopulated, yet they found protection from the weakness and divisions of the English. At length both parties began to grow weary of a war, which, though carried on but feebly, was yet a burden greater than either could support. But the terms of peace insisted upon by both were so wide of each other, that no hopes of an accommodation could quickly be expected. A truce, therefore, for twenty-two months, was concluded in 1443, which left every thing on the present footing between the parties. No sooner was this agreed upon, than Charles employed himself with great industry and judgment in repairing those numberless ills to which his kingdom, from the continuance of wars both foreign and domestic, had so long been exposed. He established discipline among his troops, and justice among his governors. He revived agriculture, and repressed faction. Thus being prepared once more for taking the field, he took the first favourable occasion of breaking the truce; and Normandy was at the same time invaded by four powerful armies; one commanded by Charles himself,

a second by the duke of Brittany, a third by the count of Alençon, and a fourth by the count Dunois. Every place opened its gates almost as soon as the French appeared before them. Rouen was the only one that promised to hold out a siege; but the inhabitants clamoured so loud for a surrender, that the duke of Somerset, who commanded the garrison, was obliged to capitulate. The battle, or rather the skirmish, of Fourmingsi, was the last stand which the English made in defence of their French dominions. However, they were put to the rout, and above a thousand were slain. All Normandy and Guienne, that had so long acknowledged subjection to England, were lost in the space of a year; and the English saw themselves entirely dispossessed of a country which for above three centuries they had considered as annexed to their native dominions. Calais alone remained of all their conquests; and this was but a small compensation for the blood and treasure which had been lavished in that country, and only served to gratify ambition with a transient applause.

Thus, in the year 1450, the power of the English in France was entirely destroyed; and Charles deservedly obtained the surname of *Victorious*, on account of the vigour he had shown in driving out the invaders of his country. His satisfaction, however, was now greatly diminished by domestic misfortunes. The dauphin, forgetting the allegiance and filial duty he owed to his father, had already impeded his conquests by his seditious intrigues. He had used every endeavour to thwart the designs of his ministers, and it was supposed that he had destroyed Agnes Soreille his father's favourite mistress by poison. He had married Charlotte daughter to the duke of Savoy; which Charles had resented by a declaration of war against the duke, but had been persuaded to recall it in order to prosecute the war against Guienne, which made part of the dominions of the English. At last, weary of the disobedience of his son, he commanded him to be arrested; but Louis, informed of his design, withdrew to Franche Comte, and afterwards to Brabant; of which the duke of Burgundy (at this time sovereign of the country) was no sooner apprised, than he ordered him to be supplied with every necessary, and treated with all imaginable respect. He refused to see him, however, until he should obtain the approbation of his father; on which Louis, having in vain attempted to draw the duke into a participation of his crimes, employed himself in sowing dissension betwixt his benefactor and his son the count of Charolois, at the very time that he himself was receiving a pension of 12,000 crowns annually from the father. Thus he at last destroyed the domestic peace of his benefactor, while his unnatural behaviour created continual suspicions in the mind of his father. Charles was repeatedly informed that his own domestics, along with his undutiful son, were in a conspiracy against his life. The miserable monarch, therefore, in continual fear of being poisoned, and having none in whom he could repose any confidence, obstinately refused for some days to take any nourishment; and when at last prevailed upon by the importunities of his attendants to do so, his stomach had become incapable of receiving food, so that he died for want of sustenance in the year 1461. His body, neglected by his unnatural son, was interred at the ex-

France.

106
Domestic
misfortunes
and death of
Charles.

pence

France.

pence of Tannegui de Chastel, who had been his faithful companion.

107
Reign of
Louis XI.

On the death of Charles, his son Louis succeeded to the throne, to which he had so long aspired. He was reckoned one of the greatest politicians that ever existed; though his character was not on that account the more amiable; on the contrary, there are few princes whose history appears in a more detestable light. So destitute was he of natural affection, that he did not even attempt to conceal his joy at his father's death. He pretended much friendship for the count of Charolois, son to the duke of Burgundy, on account of the protection he had received at his father's court; and even conferred upon him a pension of 12,000 crowns annually: but all this show of affection soon degenerated into a mortal aversion on both sides. Some differences which took place between the courts of France and Castile produced an interview betwixt the two monarchs, Louis, and Henry surnamed the *Impotent*. They met at Mauleon on the confines of Navarre: but their negotiations came to nothing, and they parted with a mutual contempt of each other; Henry despising the mean and sordid appearance of Louis, as he in his turn did the gaudy magnificence of Henry. In his negotiations with the duke of Burgundy, Louis proved more successful; persuading him to restore some towns on the river Somme, which had been ceded by Charles VII. and by the possession of which the duke was in effect master of Picardy. This cession was opposed by the count of Charolois; but Louis, by corrupting John de Croy the duke's minister, obtained his end; and for the sum of 400,000 crowns the cities were delivered to him. By this transaction he effectually ensured the hatred of Charolois: and even in that very transaction the duplicity of Louis was eminently displayed; for though he had agreed to retain in those towns the officers appointed by the duke, he was no sooner in possession of them than he displaced them all, and nominated others in their stead.

108
Formidable
confederacy
against
Louis.

The duchy of Brittany was at this time governed by Francis, a weak but generous prince, and whose defect of capacity was supplied by the abilities of his ministers. Him Louis insulted in the most grievous manner; and as Francis found himself unable to oppose such a powerful adversary alone, he joined in a close alliance with the duke of Burgundy and the count of Charolois; the latter having been grievously offended with Louis, and even accused him of attempting his life. The conspiracy was joined by several of the principal French nobility, who had been oppressed by the king; and though the secret was confided to upwards of 500 persons, not one of them ever divulged it. Louis finding matters become very critical, marched with an army towards the capital, which the count of Charolois already insulted. A battle ensued, in which both princes exerted themselves to the utmost, though their valour was but ill seconded by the bravery of their troops. About 1500 perished on each side; but the count of Charolois remained master of the field of battle. Louis, however, after this engagement, entered the capital; where he endeavoured, by every kind of concession he could think of, to conciliate the affection of his subjects; in which he succeeded so well, that though the army of insurgents

was soon augmented to more than 100,000 men, they were unable to make themselves masters of the city. At last a treaty was set on foot betwixt Louis and the count of Charolois; by which the latter obtained the towns which had been formerly ceded, with the districts of Boulogne, Guisne, Peronne, Mondidior, and Roye, as a perpetual inheritance for himself. By granting favours to the other confederates, the league was broken; and the moment that Louis found himself freed from danger, he protested against the whole treaty in presence of some confidential members of parliament, as contrary to the interests of the crown; and therefore waited the first favourable opportunity to crush one by one those who had been ready by their united efforts to destroy himself. The duke of Bourbon, one of the most able of the confederates, was gained over, by bestowing upon him in marriage Jane the natural daughter of Louis himself, with the dowry of Usson in Auvergne; together with Moras, Beaurepaire, and Cormillon in Dauphiny; while, by the discontents betwixt the dukes of Brittany and Normandy, he was enabled to secure the neutrality of the former, and to recover from the latter some territories which he had unwillingly ceded to him.

In 1467, Philip duke of Burgundy, from his amiable qualities surnamed *The Good*, died, and left his dominions to his son Charles count of Charolois. That fiery and impetuous prince, jealous of the growing power of France, and an implacable enemy of Louis, had entered into a secret treaty with Francis; but Louis had driven the Bretons from the posts they occupied in Normandy before the duke of Burgundy could pass the Somme. The king, however, alarmed at the power of the confederates, concluded a peace with Brittany; and, confiding in his talents for negotiation, determined to have a personal interview with the duke of Burgundy.

This memorable interview took place in the year 1468; and Peronne, a city of Picardy, but belonging to the duke of Burgundy, was appointed as the place of rendezvous. To this place the politic Louis repaired with a slender train, and attended only by Cardinal Balue, the duke of Bourbon, and the count de St Pol, constable of France; seemingly without reflecting that he was entering an hostile city, where he might be confined for any length of time, or treated at the pleasure of the duke, who was his mortal enemy. Indeed he had not long been in the place when he began to see the error of his conduct; and by the daily concourse of Burgundian lords and other persons of rank, who were his avowed enemies, he became alarmed for his personal safety. His fear now suggested to him a worse measure than even the former; and he requested apartments in the castle, where it was in the power of his rival in a moment to make him a close prisoner. This event accordingly took place, and that through the arts and machinations of Louis himself. His design had been from the beginning to keep the duke of Burgundy constantly employed in domestic wars. For this purpose he had, before his interview with Charles, excited the inhabitants of Liege, who were subject to the duke of Burgundy, to revolt. It is most probable, that he did not imagine the effects of this treachery would so soon begin to appear. At the very time, however, that Louis was

France.

109
Peace con-
cluded.

110
Treachery
of Louis.

111
Louis im-
prisoned by
Charles.

in

France.

in the castle of Peronne, the people of Liege revolted, seized the bishop and governor; and having massacred great numbers of the adherents of Charles, retired with the prisoners they had made to the capital. Charles was soon informed of this massacre, with the additional circumstance, that the ambassadors of Louis were seen animating the insurgents to their work of destruction. He then flew into a transport of rage; commanded the gates of the castle to be shut and strictly guarded; denouncing the severest vengeance on the perfidious monarch who had so often deceived him. Louis, however, though greatly, and no doubt very justly, alarmed, did not neglect to take the proper methods for securing himself. He distributed large sums of money among those officers to whom he imagined the duke was most inclined to pay any regard, and by splendid promises and presents endeavoured to allay the resentment of his other enemies. At last the resentment of Charles having subsided, he entered into a treaty with the king, and concluded it upon much the same terms as those which had been agreed upon before. His resentment, however, still manifested itself so far, that he insisted upon Louis being present at the punishment he inflicted upon the inhabitants of Liege for the massacre they had committed, and of which we have already taken notice. This was agreed to: the two princes formed the siege of the city in conjunction; and, notwithstanding the obstinate defence of the people, it was at last taken by storm, and the inhabitants massacred. It was not long, however, before the new alliance was dissolved. A confederacy against Louis, whom neither promises nor treaties could bind, was formed betwixt his own brother the duke of Normandy and the duke of Burgundy; but before their measures were ripe for execution, Louis had already commenced hostilities. The duke of Burgundy, as a peer of France, was summoned to parliament; and on his refusal, the constable St Pol made himself master of St Quintin. Several other cities were soon after reduced; and Baldwin, the natural brother of Charles, corrupted by Louis, deserted his cause; and the haughty spirit of the duke was thus at last obliged to condescend to solicit a peace. This, however, was of no long duration. Charles, encouraged by the success of Edward IV. of England his brother-in-law, began once more to league against Louis with the dukes of Brittany and of Guienne; the latter being the king's brother, formerly duke of Normandy, but who had exchanged that duchy for the territory of Guienne. But while the affairs of the confederates seemed to be in a prosperous way, their prospects were suddenly overcast by the death of the duke of Guienne, which was universally supposed to have been occasioned by poison, and Louis was as universally looked upon as the author. The abbot of St Joan d'Angeli was fixed upon as the immediate perpetrator of the deed: but on the day appointed for his trial he was found strangled in his cell; and this also was with great probability supposed to have been the deed of Louis, who after the death of his brother instantly seized on the territory of Guienne, and annexed it to the dominions of France.

112
A treaty
between
Louis and
Charles.

By this unheard of conduct of the French monarch, Charles was exasperated to such a degree, that he vowed the most dreadful vengeance against the unhappy

people of France, and threatened to sacrifice to the memory of the duke of Guienne every one who now fell into his hands. The citizens of Nefle were massacred without distinction of sex or age; Beauvis resisted his attacks; after which Charles wreaked his fury on other places. Having entered the country of Caux, he reduced the cities of Eu and St Valery, burnt Longueville, and wasted the whole country as far as Rouen. Louis, on the other hand, steady and constant in his designs, determined to dissolve the league between the duke of Brittany and Edward IV. of England. Accordingly he encamped with his army on the frontiers of Brittany; while the duke, not meeting with the assistance promised by Edward, was obliged to consent to a truce for a year; and the duke of Burgundy himself was obliged to follow his example, having committed such devastations as deprived him of all means of subsistence in the country, so that he could neither advance nor retreat. In a very little time, however, he again began to conspire with the king of England against Louis, and a powerful invasion was determined upon. Edward was to cross the sea with an army of 10,000 men, while Charles assembled all his forces to join him. The former was also to set up a claim to the crown of France, and at least to obtain the provinces of Normandy and Guienne; the duke was to have Champagne with some adjacent districts; to free his dominions from homage; and neither party was to make peace without the consent of the other. It was supposed that the duke of Brittany would naturally accede to the confederacy; and the count de St Pol, constable of France, had engaged to deliver up the town of St Quintin and others which he occupied on the river Somme. Louis, however, still had the good fortune to avoid the storm. Charles, instead of advancing to the assistance of Edward, who had entered France at the head of 15,000 archers and 1500 men at arms, laid siege to the city of Nuiz on the Rhine; while the constable St Pol, instead of delivering up the towns as he had promised, deceived his allies, and enabled Louis to dissolve a confederacy, which, had it been vigorously maintained, might have involved him in the greatest difficulties. To procure the departure of Edward, however, he was obliged to consent to a tribute of 75,000 crowns, as well as to settle on the king himself 50,000 crowns for life; betrothing also the dauphin to the eldest daughter of the king of England. The duke of Burgundy exclaimed loudly against this treaty: but Edward persisted in his resolution; and it was accordingly executed at a place called *Pecquigny*, near Amiens; but in such a manner as showed the little confidence the two sovereigns reposed in each other. A grated barrier was erected in the middle of the bridge of Pecquigny, between the barriers of which only a man's arm could pass: the two princes appeared on the opposite sides of it; and having conferred privately, and confirmed the treaty between them, parted with many protestations of friendship; in which, probably, neither party was very sincere. A power was reserved by Edward, for the duke of Burgundy to accede to the treaty; but the latter haughtily replied, that he was able to support himself without the assistance of England; and that he would make no peace with Louis till three months after the return of Edward to his own country.

France.

113
Furious in-
vasion of
France by
Charles of
Burgundy.

114
Invasion by
Edward IV.
of England.

115
Louis
agrees to
pay an an-
nual pen-
sion to Ed-
ward.

France. country. To this resolution he adhered; but no sooner was the term expired, than he concluded a truce with Louis for nine years. The stipulations publicly agreed upon betwixt these two princes consisted only in some articles for the mutual advantage of their subjects; but privately they had signed others of a different nature. The constable St Pol having rendered himself obnoxious to all parties by his complicated treachery, fled to Mons in Hainault; but the duke of Burgundy had already consented to deliver him up on condition of receiving his estates and moveables as the price of his treachery.

Thus was Louis, without any other remarkable qualification than the mere arts of falsehood and duplicity, got rid of all his enemies except the duke of Burgundy, whose growing power rendered him a constant object of jealousy and terror. His own imprudence and rashness, however, soon proved his ruin. Having rashly engaged in a war with the Swifs, he was defeated in the first engagement with that martial nation, with the loss of his military chest and baggage, with his plate and jewels, supposed to be the richest in Europe. His disappointment on this occasion was so great, that he was seized with a severe sickness, from which he had hardly recovered when he resumed his mad scheme of conquering the Swifs. Another battle ensued; in which, after an obstinate dispute, Charles was defeated with the loss of 18,000 men, himself escaping with great difficulty. This disaster was followed by the defection of most of his allies: the duke of Lorraine recovered the city of Nancy and great part of his dominions which Charles had seized; while the latter, overwhelmed with shame and disappointment, spent his time in solitude and inactivity. From this he was at last roused by the misfortunes which fell upon him in such quick succession. He now invested the city of Nancy; and in this, as well as in every other instance, he acted against the advice of his best officers; and the consequences were still more fatal than before. The duke of Lorraine advanced with a strong body of Germans to the relief of the city, while Charles had scarcely 4000 men to oppose him. His troops were therefore easily defeated, and himself, notwithstanding the most heroic efforts of valour, hurried away in the crowd. The count de Campobasso, an Italian nobleman in whom he put a great deal of confidence, but who was in reality a traitor, had deserted with about 80 men in the beginning of the engagement. He left 12 or 15 men about the duke's person, with strict orders to assassinate him in the tumult; and this order they punctually complied with; the body of Charles being found two days after the battle, pierced with three wounds.

The news of Charles's death was received with the most unfeigned joy by Louis, whose sole object now was to unite the territories of the duke of Burgundy to his own. This might be done in two ways; one by a match betwixt the dauphin and Mary the heiress of Burgundy; the other, by marrying her to the duke of Angoulême, a prince of the royal blood of France, and on whom Mary had shown some inclination to bestow herself. The king, however, to whom duplicity and falsehood seem to have been absolutely necessary, chose a third method, more agreeable to his character. The match with the dauphin was attended with such

circumstances as rendered it evidently impracticable. The disparity of age was very great, the dauphin being only eight years old, and the princess twenty; the Flemings were besides very much averse from submitting to a prince whose powerful resources would enable him to oppress their liberties: but, notwithstanding these insurmountable difficulties, Louis chose to insist upon the match, at the same time that he endeavoured to make himself master of her dominions by force of arms. He addressed circular letters to the principal cities of Burgundy; representing, that the duchy had been given by king John to the male heirs of his son Philip; and that now, when these were extinct by the death of Charles, the territory reverted of course to the crown. To render this argument more effectual, he corrupted the governors of some towns, seduced the inhabitants of others to rise against their governors; whilst he himself, at the head of an army, prepared to enforce obedience from those who could not be worked upon by other methods. Thus the province of Burgundy was entirely reduced; but Flanders could not be brought under subjection either by fair means, force, or fraud. In his conduct for this purpose, indeed, Louis displayed the most detestable as well as the meanest treachery and falsehood. To render Mary odious to her subjects, he negotiated with her ministers, and prevailed upon them to disclose to him some of the most important state secrets; after which he communicated their letters to the states of Flanders. This double treachery, however, did not at present answer his purpose. The two ministers whom he had betrayed were indeed put to death without mercy, and that even in the presence of their sovereign: but Mary herself was thus induced to bestow herself upon the emperor Maximilian; and Louis had the mortification to find that all his arts had contributed only to aggrandize a rival power, whom he had already sufficient cause to dread. To remedy this oversight, he entered into an alliance with Edward IV. of England, whom he had inspired with a jealousy of his brother Clarence, in order to prevent a match betwixt that nobleman and the princess Mary, which had also been in agitation. Thus a peace was concluded between the two monarchs, to continue during the life of each, and for a year after.

The marriage of Mary with Maximilian effectually secured the independence of Flanders; while the return of the prince of Orange to the party of that princess extended the flames of war once more to the cities of Burgundy. The French were on the point of being totally expelled from that country, when Maximilian unexpectedly made proposals of peace. A truce was on this concluded between the two princes; but without any term limited for its duration, or without any conditions stipulated in favour of the Burgundians; so that the whole country was quickly after reduced by Louis.

The king now, freed from the apprehension of foreign enemies, turned his vindictive disposition against his own subjects; over whom, under pretence of former rebellions, he exercised the most insupportable tyranny. The principal victim to his sanguinary disposition on this occasion was James d'Armagnac duke of Nemours, one of the first noblemen in the kingdom, but who had formerly appeared a zealous confederate against:

France.

116
Charles engaged in a war with the Swifs.

117
He is assassinated.

118
Conquest of Burgundy by Louis.

119
Tyranny and cruelty of Louis.

France.

against him in the league in which Edward and Charles were concerned. The unfortunate nobleman, knowing that vengeance was determined against him, fled to a fortress named *Carlat*, situated among the mountains of Auvergne. Here he was besieged by the Seigneur de Beaujeu, who had married Anne the daughter of Louis. The place, however, was almost impregnable to any force; so that his enemies were obliged to make the most solemn promises of safety in order to induce him to surrender himself. By these he was at last persuaded to trust himself in the hands of the faithless tyrant; who no sooner had him in his power than he shut him up in the Bastille in an iron cage, and reprimanded the judges because they had released him from this close confinement during the time of his examination. The judges reluctantly condemned him to be beheaded: but the king's cruelty extended beyond the sentence; and he ordered the two young sons of the duke, though yet in early childhood, to be placed directly under the scaffold, that they might be covered with the blood of their father. Four thousand persons are supposed to have perished upon this occasion without any form of trial: and were it not for the concurrent testimony of the historians of that age, the inhumanities and barbarities of this monarch are scarce to be credited. By these he broke the spirits of the French nobility, and gradually extended the power of the crown beyond all bounds; so that at last it was limited only by the sovereign's pleasure. Amidst all the perfidy and cruelty, however, for which this monarch is so justly to be detested, we may on some occasions remark a kind of magnanimity and generosity, which we cannot but applaud. An instance of this was his supporting the house of Medici against pope Sextus, whom he obliged to desist from his attacks, and to recall his sentence which he had fulminated against them.

120
Burgundy
unsuccess-
fully inva-
ded by
Maximi-
lian.

In 1479, the emperor Maximilian, who had lightly abandoned the duchy of Burgundy when he might have reduced it, now renewed his claims when it was no longer in his power to enforce them. After a variety of actions of lesser note, and the destruction of cities on both sides, a decisive battle was fought at Guinegate. Here the Flemings were routed; but as the French pursued with too great ardour, the infantry of the enemy rallied, and the battle was renewed with great slaughter on both sides. A more decisive advantage was afterwards gained by the capture of 80 Flemish vessels, which induced that commercial people to think of peace. In the mean time, however, Louis, after a life spent in continual deceit, hypocrisy, and cruelty, received warning of his approaching end by a fit of apoplexy with which he was seized in the year 1480. He lay speechless and motionless for two days; after which he recovered in some degree, but never completely regained his health and strength. His illness, however, neither prevented him from pursuing the schemes of his ambition, nor from using the same methods as before to attain them. He seized, without any pretence, the estates of the duke of Bourbon, the only nobleman in the kingdom whose power could give him any cause of suspicion; yet, notwithstanding his assiduity for the interest of the dauphin, he kept him a kind of prisoner in the castle of Amboise, permitting none but his own servants, or per-

No 131.

sons of the meanest rank, to have access to him. He banished his own consort, the mother of the dauphin, to Savoy, and endeavoured to inspire the prince with aversion towards her. By the death of Charles, the titular king of Naples, and the last of the second house of Anjou, he became master of the county of Provence; but his satisfaction on this occasion was marred by a second stroke of apoplexy. Still, however, he revived, and, with his recovery, again began to pursue his ambitious intrigues. The death of Mary of Burgundy, who perished by a fall from her horse, inspired him with new views; and he betrothed his son to the infant daughter of the emperor. Thus he offended Edward IV. of England, whose eldest daughter Elizabeth had been previously contracted to the dauphin; and a war would have undoubtedly ensued, had it not been for the death of the king of England. This was followed in no long time after by that of Louis himself, who had in vain exhausted the skill of Louis XI. the physician, and wearied the clerical order with prayers and processions to avert the impending stroke. He expired in the year 1483, after a reign of 23 years; during which he was detested by his subjects, whom he had continually oppressed; and equally dreaded and hated by his neighbours, whom he had constantly deceived; notwithstanding which he obtained the title of *Most Christian* from his holiness, which his successors have ever after retained.

Notwithstanding the dark character of this prince, it is undoubtedly to be allowed, that he laid the foundations of the future greatness of France. By his arts he deprived the common people of their liberty, depressed the power of the nobility, established a standing army, and even induced the states to render many taxes perpetual, which formerly were only temporary, in order to support the army which was to keep themselves in slavery. From this time the people were accustomed to submit entirely to the voice of their sovereign as their only legislator; and being always obedient in matters of the greatest consequence, they cheerfully contributed whatever sums were required to fulfil the king's pleasure.

Charles VIII. who succeeded his father Louis XI. in 1483, was only 14 years of age at the time of his father's death: but though he might, even at that age, have ascended the throne without any material violation of the laws of France, yet it was judged necessary to have a regent on account of the king's delicacy of constitution and want of education. Three competitors appeared as candidates for this important trust; viz. John duke of Bourbon, a prince of the blood, and who had, till the age of 60, maintained the most unblemished character; Louis duke of Orleans, presumptive heir to the crown, but who from his being only 20 years old himself, seemed incapacitated on that account from undertaking such an important office: the third competitor was Anne, the eldest daughter of Louis, to whom the latter had in the last moments of his life committed the charge of the kingdom, with the title of governess. The claim of this lady was supported by the assembly of the states-general at Tours; and though she was only entered into the 22d year of her age, it appears that the office could not have been more properly bestowed. Being married to Peter of Bourbon, sire of Beaujeu,

France.

121
Death of
Louis XI.

122
Reign of
Cha. VIII.

123
Regency of
the Lady
Beaujeu.

her

France.

her present title was *the Lady of Beaujeu*; but she appears to have acted entirely independent of her husband, who was but of a moderate capacity, and indeed had been recommended to her by Louis on account of his slender abilities, left by any other match the house of Bourbon should be too much aggrandized. Her first step was to ingratiate herself with the people by some popular acts; among which one was to punish the instruments of her father's cruelties. One of these, named Olivier le Dain, who, from the station of a barber, had raised himself to the confidence and favour of the king, and had distinguished himself by the invention of new modes of torture, was publicly hanged. Another, named Jean Doyac, who by continual acts of violence and rapacity had oppressed the people, was condemned, after being whipped in all the open places or squares of Paris, to have one of his ears cut off, and his tongue pierced with a hot iron; after which he was conveyed to his native city of Montferrand, where he was again whipped, and his other ear cut off; after which his estates, as well as those of Olivier, were confiscated. Jacques Coitier, the physician of Louis, who had availed himself of the terror of death with which the king was strongly influenced, to extort great sums of money from him, was ordered to answer for the immense wealth he had acquired; but he averted the danger by paying a fine of 50,000 crowns.

Thus the lady de Beaujeu gained the affection of the people at large; and was equally successful in gaining over those who were averse to her government. The duke of Bourbon was made constable, an office which he had long desired; but the duke of Orleans behaved in such a manner as to exclude all hopes of favour. Incensed at the determination of a trifling dispute at tennis against him, by the lady Beaujeu, he exclaimed, that whoever had decided it in that manner "was a liar if a man, or a strumpet if a woman." After this furious declaration he fled to the castle of Beaujency, where, however, he was soon forced to surrender. He then applied to Henry VII. of England, who had newly ascended the throne of England; but that prince, naturally slow and cautious, did not pay much attention to his proposals; on which he next made his application to the court of Brittany. Here he was received with great marks of esteem, and began to entertain hopes of marrying the daughter of the duke; but being looked upon with a jealous eye by the nobility, they entered into secret negotiations with Anne, and even solicited her to invade the country. In these negotiations, however, they stipulated that only a certain number of troops should enter the province, and that no fortified place should remain in the hands of the French; which conditions were indeed agreed to by the regent, though she determined to keep them no longer than it answered her purpose. In pursuance of this resolution, Brittany was invaded at once by four armies, each of them superior to the stipulated number, who quickly made themselves masters of the most important places in the country; while the troops of the duke retired in disgust, leaving them to pursue their conquests as they pleased. Finding at last, however, that the entire subjection of their country was determined upon, the nobility began to exert themselves in defence of it; and, inflamed by the enthusiasm of liber-

ty, they raised an army of 60,000 men. By these the French were compelled to abandon the siege of Nantz; but this proved only a transient gleam of success. Anne persevered in her design of completing the conquest of the country, and the state of Europe at that time favoured the design. Of all the European states, England alone was then capable of affording any effectual assistance; and the slow caution of Henry prevented him from giving the assistance which for his own interest he ought to have done. Thus the Bretons were left to defend themselves the best way they could; and having ventured a battle, they were entirely defeated, and most of their leaders taken prisoners. A small body of English, under the command of lord Woodville, who assisted them, were entirely cut in pieces. The duke soon after died by a fall from his horse, leaving his dominions to his daughter Anne, at that time only 13 years of age. A marriage was negotiated betwixt this princess and Maximilian king of the Romans, who had been married to Mary of Burgundy; but by reason of the poverty of that prince it was never completed. The lady Beaujeu, then, finding that the absolute conquest of Brittany would still be a difficult matter, determined to conclude a marriage betwixt the young king of France and the duchess, though the former had already been married to Margaret of Austria, the daughter of Maximilian. This marriage indeed had not been consummated by reason of the tender age of the princess; but she had been sent to Paris for her education, and had for several years been treated as queen of France. In 1491, however, Margaret was sent back to her father: Anne of Brittany for a long time refused to violate the engagements into which she had entered; but at last, finding herself distressed on all sides, and incapable of resisting the numerous forces of France with which she was pressed, she reluctantly consented to the match, and the nuptials were celebrated the same year at Langeais in Touraine.

Maximilian, whose poverty had prevented him from giving any assistance to his bride, or even from coming to see her, enraged at the double disgrace he had suffered, began, when too late, to think of revenge. France was now threatened with an invasion from the united forces of Austria, Spain, and England. But this formidable confederacy was soon dissipated. Henry, whose natural avarice had prevented him from giving the necessary assistance, was bought off with money: the immediate payment of 745,000 crowns, and the promise of 25,000 annually ever after, persuaded him to retire into his own country. Ferdinand king of Spain had the counties of Roussillon and Cerdagne restored to him; while Maximilian was gratified by the cession of part of Artois, which had been acquired by Louis XI.

The young king of France agreed to these terms the more readily, that he was impatient to undertake an expedition into Italy, in order to conquer the kingdom of Naples, to which he claimed a right. Most of his counsellors were against the expedition; but the king was inflexible, even though Ferdinand king of Naples offered to do homage for his kingdom, and pay him a tribute of 50,000 crowns a-year. He appointed Peter duke of Bourbon regent in his absence; after which he set out on his expedition with very few

France.

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Marriage between the king of France and duchess of Brittany.

124

Duke of Orleans flies to Brittany.

125

That country invaded by the French.

127

His expedition into Italy, and surprising success.

France. troops and very little money. By the way he fell ill of the small-pox, but in a short time recovered, and entering Italy with only 6000 horse and 12,000 foot, he was attended with the most surprising success, traversing the whole country in six weeks, and becoming master of the kingdom of Naples in less than a fortnight. Such extraordinary good fortune seemed miraculous; and he was reckoned an instrument raised up by God to destroy the execrable tyrants with which Italy was at that time infested. Had Charles made use of this prepossession in his favour, and acted up to the character generally given him, he might have raised his name as high as any hero of antiquity. His behaviour, however, was of a very different nature. He amused himself with feasts and shows; and leaving his power in the hands of favourites, they abandoned it to whoever would purchase titles, places, or authority, at the rates they imposed; and the whole force he proposed to leave in his new conquered dominions amounted to no more than 4000 men.

But while Charles was thus losing his time, a league was concluded against him at Venice; into which entered the pope, the emperor Maximilian, the archduke Philip, Ludowic Sforza, and the Venetians. The confederates assembled an army of 40,000 men, commanded by Francis marquis of Mantua; and they waited for the king in the valley of Farnova, in the duchy of Parma, into which he descended with 9000 men. On the 6th of July 1495 he attacked the allies; and, notwithstanding their great superiority, defeated them, with the loss of only 80 of his own men. Thus he got safe to France; but his Italian dominions were lost almost as soon as he departed. Some schemes were proposed for recovering these conquests; but they were never put in execution, and the king died of an apoplexy in 1498.

128
His death.

The premature death of this monarch, in the 28th year of his age, was supposed to have been owing to his irregular life, and particularly his attachment to women; which had for some time impaired his health, and brought on evident symptoms of his approaching dissolution. At last he relinquished his irregularities, and retired with the queen to the castle of Ambloise. Here in passing through a low door he struck his head with violence against the top. No unfavourable symptom appeared at the time; but soon afterwards, as he conversed with his confessor, and avowed his design of observing the nuptial fidelity he owed to the queen, he suddenly fell backward in a fit of apoplexy. He recovered his voice three times, and uttered some expressions of devotion; but instantly relapsed, and in a short time expired, notwithstanding every assistance that could be given. He was greatly celebrated for his sweet temper and agreeable disposition, which procured him the surnames of the *Affable* and *Courteous*. Two of his domestics are said to have died of grief after his death, and his widow abandoned herself to the most pungent sorrow for *two days*.

By the death of Charles VIII. the throne of France passed from the direct line of the house of Valois, and Louis duke of Orleans succeeded to the throne. At the time of his accession he was in his 36th year, and had long been taught prudence in the school of adversity. During the administration of the Lady Beaujeu, he had been, as we have already observed, constantly in disgrace; and after his connections with the

duke of Brittany, had spent a very considerable time in prison; and though afterwards set at liberty by Charles, he had never possessed any share of that monarch's confidence or favour. Towards the conclusion of that reign, he fell under the displeasure of the queen; and had afterwards continued at his castle of Blois till he was called from thence to the possession of the kingdom. He had been married in early life, and against his will, to Jane the youngest daughter of Louis XI. a princess of an amiable disposition, but deformed in her person, and supposed to be incapable of bearing children. Afterwards he entertained thoughts of having this marriage dissolved, and was supposed to possess the affection of the duchess of Brittany before she became queen of France. After the death of her husband, that princess retired to Brittany, where she pretended to assume an independent sovereignty; but Louis having got his marriage with Jane dissolved by Pope Alexander VI. quickly after made proposals to the queen-dowager, which on her part were accepted without hesitation; though it was stipulated, that if she should have two sons, the younger should inherit the duchy of Brittany.

As Louis, while duke of Orleans, had some pretensions to the kingdom of Naples, he instantly set about realizing them by conquest. On his accession, he found matters in that country much more favourable to his designs than formerly. The pope, Alexander VI. was very much in his interests, from the hopes of getting his son Cæsar Borgia provided for: he had conciliated the friendship of the Venetians by promising them a part of the Milanese; he concluded a truce with the archduke Philip; and renewed his alliances with the crowns of England, Scotland, and Denmark. He then entered Italy with an army of 20,000 men; and being assisted by the Venetians, quickly conquered one part of the duchy, while they conquered the other, the duke himself being obliged to fly with his family to Inspruck. He then attacked Ferdinand of Spain with three armies at once, two to act by land, and one by sea; but none of these performing any thing remarkable, he was obliged to evacuate the kingdom of Naples in 1504.

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Expedition of Louis XII. into Italy.

In 1506, the people of Genoa revolted; drove out the nobility; chose eight tribunes; and declared Paul Nuova, a silk-dyer, their duke: after which, they expelled the French governor, and reduced a great part of the Riviera. This occasioned Louis's return into Italy; where, in 1507, he obliged the Genoese to surrender at discretion: and, in 1508, entered into the league of Cambray, with the other princes who at that time wanted to reduce the overgrown power of the Venetians. Pope Julius II. who had been the first contriver of this league, very soon repented of it; and declared, that if the Venetians would restore the cities of Faenza and Rimini, which had been unjustly taken from him, he would be contented. This was refused; and in 1509, the forces of the republic received such an entire defeat from Louis, that they agreed to restore not only the two cities demanded by pope Julius, but whatever else the allies required.

The pope now, instead of executing his treaties with his allies, made war on the king of France without the least provocation. Louis called an assembly of his clergy; where it was determined, that in some cases it was lawful to make war upon the pope; upon which

France. the king declared war against him, and committed the care of his army to the Marshall de Trivulce. He soon obliged the pope to retire into Ravenna; and in 1511, Gaston de Foix, duke of Nemours, gained a great victory at Ravenna, but was himself killed in the engagement. After his death the army disbanded for want of pay; and the French affairs in Italy, and every where else, fell into great confusion. They recovered the duchy of Milan, and lost it again in a few weeks. Henry VIII. of England invaded France, and took Terruene and Tournay; and the Swiss invaded Burgundy with an army of 25,000 men. In this desperate situation of affairs the queen died, and Louis put an end to the opposition of his most dangerous enemies by negotiating marriages. To Ferdinand of Spain he offered his second daughter for either of his grandsons, Charles or Ferdinand; and to renounce, in favour of that marriage, his claims on Milan and Genoa. This proposal was accepted; and Louis himself married the princess Mary, sister to Henry VIII. of England. This marriage he did not long survive, but died on the 2d of January 1514; and was succeeded by Francis I. count of Angoulême, and duke of Bretagne and Valois.

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his marriage with the princess Mary of England, and death.

131
Francis I. invades Italy.

132
defeated and taken prisoner.

Milanese also made their way back again as well as they could. Henry VIII. under the influence of cardinal Wolsey, resolved not to oppress the oppressed: he therefore assured the regent that she had nothing to fear from him; and at the same time advised her not to consent to any treaty by which France was to be dismembered. To the emperor, however, he used another language. He told him, that the time was now come when this puissant monarchy lay at their mercy; and therefore, that so favourable an opportunity should not be let slip: that, for his part, he should be content with Normandy, Guienne, and Gascony, and hoped the empire would make no scruple of owning him king of France: adding, that he expected the emperor would make a right use of his victory, by entering Guienne in person; in which case he was ready to bear half the expences of the war. He foresaw what fell out: the emperor was alarmed at these conditions, and did not care to have him for a neighbour; for which reason he agreed to a truce with the regent for six months. In Picardy the Flemings were repulsed; and the count de Guise, with the duke of Lorraine, had the good fortune, with a handful of troops, to defeat and cut to pieces the German peasants.

France.

In the mean time, Francis was detained in captivity in Italy: but being wearied of his confinement in that country, and the princes of Italy beginning to cabal for his deliverance, he was carried to Madrid; where, on the 14th of January 1525, he signed a treaty, the principal articles of which were, That he should resign to the emperor the duchy of Burgundy in full sovereignty; that he should desist from the homage which the emperor owed him for Artois and Flanders; that he should renounce all claim to Naples, Milan, Asti, Tournay, Lisle, and Hesdin, &c.; that he should persuade Henry d'Albret to resign the kingdom of Navarre to the emperor, or at least should give him no assistance; that within 40 days he should restore the duke of Bourbon and all his party to their estates; that he should pay the king of England 500,000 crowns which the emperor owed him; that when the emperor went to Italy to receive the Imperial crown, he should lend him 12 galleys, four large ships, and a land-army, or instead of it 200,000 crowns.

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Francis I. carried to Madrid, where he signs a disadvantageous treaty.

All these articles the king of France promised on the word and honour of a prince to execute; or, in case of non-performance, to return prisoner into Spain. But, notwithstanding these professions, Francis had already protested before certain notaries and witnesses in whom he could trust, that the treaty he was about to sign was against his will, and therefore null and void. On the 21st of February, the emperor thought fit to release him from his prison, in which he had been closely confined ever since his arrival in Spain; and after receiving the strongest assurances from his own mouth, that he would literally fulfil the terms of the treaty, sent him under a strong guard to the frontiers, where he was exchanged for his two eldest sons, who were to remain as hostages for his fidelity.

When the king returned to his dominions, his first care was to get himself absolved by the Pope from the oaths he had taken; after which he entered into a league with the pontiff, the Venetians, the duke of Milan, and the king of England, for preserving the peace of Italy. In the month of June, he publicly

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France. received remonstrances from the states of Burgundy; in which they told him, without ceremony, that by the treaty of Madrid he had done what he had no right to do, in breach of the laws and his coronation-oath; adding, that if he persisted in his resolution of throwing them under a foreign yoke, they must appeal to the General States of the kingdom. At these remonstrances the viceroy of Naples and the Spanish ministers were present. They perceived the end which the king aimed at, and therefore expostulated with him in pretty warm terms. At last the viceroy told him, that he had now nothing left but to keep his royal word in returning to the castle of Madrid, as his predecessor John had done in a like case. To this the king replied, that king John acted rightly; that he returned to a king who had treated him like a king; but that at Madrid he had received such usage as would have been unbecoming to a gentleman: that he had often declared to the emperor's ministers, that the terms they extorted from him were unjust and impracticable: but that he was still willing to do all that was fit and reasonable; and to ransom his sons at the rate of two millions of gold, in lieu of the duchy of Burgundy.

Hitherto the treaty for the tranquillity of Italy had been kept secret, in hopes that some mitigation of the treaty of Madrid would have been obtained; but now it was judged expedient to publish it, though the viceroy of Naples and the Spanish lords were still at the French court; and the emperor was to be admitted into it, provided he accepted the king's offer of two millions for the release of his children, and left the duke of Milan and other Italian princes in quiet possession of their dominions. It is the common misfortune of all leagues, that the powers who enter into them keep only their own particular interests in view, and thus defeat the general intention of the confederacy. This was the case here. The king's great point was to obtain his children upon the terms he had proposed; and he was desirous of knowing what hopes there were of that, before he acted against the monarch who had them in his power. Thus the duke of Milan and the Pope were both sacrificed. The former was obliged to surrender to the duke of Bourbon, and the latter was surprised by the Colonnas; both of which disasters would have been prevented if the French succours had entered Italy in time. See ITALY.

According to an agreement which had been made between Francis and Henry, their ambassadors went into Spain, attended each of them by a herald, in order to summon the emperor to accept the terms which had been offered him; or, in case of refusal, to declare war. It seems the emperor's answer was foreseen in the court of France; and therefore the king had previously called together an assembly of the notables; that is, persons of the several ranks of his people in whom he could confide. To them he proposed the great question, Whether he was bound to perform the treaty of Madrid? or, Whether, if he did not perform it, he was obliged in honour to return to Spain? To both these questions, the assembly answered in the negative: they said, that Burgundy was united to the crown of France, and that he could not separate it by his own authority; that his person also was the property of the public, of which therefore he could not dispose; but for the two millions, which they looked

upon as a just equivalent, they undertook that it should be raised for his service. When the ambassadors delivered their propositions, Charles treated the English herald with respect, and the French one with contempt; which produced a challenge from Francis to the emperor*. All differences, however, were at last adjusted; and a treaty was concluded at Cambray, on the 5th of August 1528. By this treaty, instead of the possession, the emperor contented himself with reserving his rights to the duchy of Burgundy, and the two millions of crowns already mentioned. Of these he was to receive 1,200,000 in ready money; the prince's lands in Flanders belonging to the house of Bourbon were to be delivered up; these were valued at 400,000 more; and the remaining 400,000 were to be paid by France in discharge of the emperor's debt to England. Francis was likewise to discharge the penalty of 500,000 crowns which the emperor had incurred, by not marrying his niece the princess Mary of England; and to release a rich *fleur de lys* which had been many years before pawned by the house of Burgundy for 50,000 crowns. The town and castle of Hesdin were also yielded; together with the sovereignty of Flanders and Artois, and all the king's pretensions in Italy. As for the allies of France, they were abandoned to the emperor's mercy, without the least stipulation in their favour; and Francis himself protested against the validity of the treaty before he ratified it, as did also his attorney-general before he registered it in parliament; but both of them with the greatest secrecy imaginable.

Nothing farther of much consequence happened during the remainder of the reign of Francis I. The war was soon renewed with Charles, who made an invasion into France, but with very bad success; nor was peace fully established but by the death of Francis, which happened on the 3d of March, 1547. He was succeeded by his son Henry II. who ascended the throne that very day on which he was 29 years of age. In the beginning of his reign, an insurrection happened in Guienne, owing to the oppressive conduct of the officers who levied the salt tax. The king dispatched against the insurgents two bodies of troops; one commanded by the duke of Aumale son to the duke of Guise, the other by the constable. The first behaved with the greatest moderation, and brought back the people to their duty without making many examples: the other behaved with the utmost haughtiness and cruelty; and though the king afterwards remitted many of his punishments, yet from that time the constable became odious to the people, while the family of Guise were highly respected.

In 1548, the king began to execute the edicts which had been made against the Protestants with the utmost severity; and, thinking even the clergy too mild in the prosecution of heresy, erected for that purpose a chamber composed of members of the parliament of Paris. At the queen's coronation, which happened this year, he caused a number of Protestants to be burned, and was himself present at the spectacle. He was, however, so much shocked, that he could never forget it; but complained, as long as he lived, that, at certain times, it appeared before his eyes, and troubled his understanding.

In 1549, a peace being concluded with England, the king

France.

* See Ducl.
135
Treaty of
Cambray.

136
Francis dies
and is suc-
ceeded by
Henry II.

137
Henry per-
secutes the
Protestants.

¹³⁸ France. Advantageous treaty with England. king purchased Boulogne from the latter, for the sum of 400,000 crowns; one half to be paid on the day of restitution, and the other a few months after. Scotland was included in the treaty, and the English restored some places they had taken there. This was the most advantageous peace that France had hitherto made with England; the vast arrears which were due to that crown being in effect remitted; and the pension which looked so like tribute, not being mentioned, was in fact extinguished. The earl of Warwick himself, who had concluded the peace, was so sensible of the disgrace suffered by his nation on this occasion, that he pretended to be sick, in order to avoid setting his hand to such a scandalous bargain.

This year, an edict was made to restrain the extravagant remittances which the clergy had been in use of making to the court of Rome, and for correcting some other abuses committed by the papal notaries. With this edict Pope Julius III. was highly displeased; and the following year (1550), war was declared by the king of France against the pope and the emperor. The pretence was, that Henry protected Octavio Farnese duke of Parma, whom the pope was desirous of depriving of his dominions. In this war the king was threatened with the censures of the church, more especially when it was known that he had entered into an alliance with the Turks, and a Turkish fleet entered the Mediterranean, where they threatened the Isle of Gozo, and made descents upon Sicily. Henry, however, strongly denied any such connection, and insisted that the emperor had given them sufficient provocation: but, be this as it will, the emperor soon found himself in such danger from these new enemies, that he could not support the pope as he intended, who on that account was obliged to sue for peace. After this, the king continued the war against the emperor with success; reducing the cities of Toul, Verdun, and Metz. He then entered the country of Alsace, and reduced all the fortresses between Hagenau and Wissemburg. He failed, however, in his attempt on Strasburgh: and was soon after obliged by the German princes and the Swiss to desist from farther conquests on that side. This war continued with very little interruption, and as little success on the part of the French, till the year 1557, when a peace was concluded; and soon after, the king was killed at a tournament by one count de Montgomery, who was reckoned one of the strongest knights in France, and who had done all he could to avoid this encounter with the king.

¹⁴⁰ He is killed at a tournament. The reign of his successor Francis II. was remarkable only for the persecution of the Protestants; which became so grievous, that they were obliged to take up arms in their own defence. This occasioned several civil wars, the first of which commenced in the reign of Charles IX. who succeeded to the throne in 1560. This first war continued till the year 1562, when a peace was concluded, by which the Protestants were to have a free pardon, and liberty of conscience. In 1563, the war broke out anew, and was continued with very little interruption till 1569, when peace was again concluded upon very advantageous terms for the Protestants. After this, king Charles, who had now taken the government into his hands, caressed the Protestants in an extraordinary manner. He invited to

France. court the admiral Coligni, who was the head of the Protestant party; and cajoled him so, that he was lulled into a perfect security, notwithstanding the many warnings given him by his friends, that the king's fair speeches were by no means to be trusted: but he had soon reason to repent his confidence. On the 22d of August 1571, as he was walking from the court to his lodgings, he received a shot from a window, which carried away the second finger of his right hand, and wounded him grievously in the left arm. This he himself ascribed to the malice of the duke of Guise, the head of the Catholic party. After dinner, however, the king went to pay him a visit, and amongst others made him this compliment; "You have received the wound, but it is I who suffer;" desiring at the same time, that he would order his friends to quarter about his house, and promising to hinder the Catholics from entering that quarter after it was dark. This satisfied the admiral of the king's sincerity; and hindered him from complying with the desires of his friends, who would have carried him away, and who were strong enough to have forced a passage out of Paris if they had attempted it.

¹⁴² Dreadful massacre of the Protestants. In the evening, the queen-mother, Katharine de Medicis, held a cabinet-council to fix the execution of the massacre of the Protestants, which had been long meditated. The persons of which this council was composed, were, Henry duke of Anjou, the king's brother; Gonzagua duke of Nevers; Henry of Angoulême, grand prior of France, and bastard brother of the king; the marshal de Tavannes; and Albert de Gondi, count de Rhetz. The direction of the whole was given to the duke of Guise, to whom the administration had been entirely confided during the former reign. The guards were appointed to be in arms, and the city-officers were to dispose the militia to execute the king's orders, of which the signal was the ringing of a bell near the Louvre. Some say, that when the hour approached, which was that of midnight, the king grew undetermined: that he expressed his horror at shedding so much blood, especially considering that the people whom he was going to destroy were his subjects, who had come to the capital at his command, and in confidence of his word; and particularly the admiral, whom he had detained so lately by his caresses. The queen-mother, however, reproached him with his cowardice, and represented to him the great danger he was in from the Protestants; which at last induced him to consent. According to others, however, the king himself urged on the massacre; and when it was proposed to him to take off only a few of the heads, he cried out, "If any are to die, let there not be one left to reproach me with breach of faith."

As soon as the signal was given, a body of Swiss troops, of the Catholic religion, headed by the duke of Guise, the chevalier d'Angoulême, accompanied by many persons of quality, attacked the admiral's house. Having forced open the doors, the foremost of the assassins rushed into his apartment; and one of them asked if he was Coligni? To this he answered that he was; adding, "Young man, respect these grey hairs;" to which the assassin replied by running him through the body with his sword. The duke of Guise and the chevalier, growing impatient below stairs, cried out to

know

France. Know if the business was done; and being told that it was, commanded that the body should be thrown out at the window. As soon as it fell on the ground, the chevalier, or (as some say) the duke of Guise, wiping the blood off the face, kicked it with his foot. The body was then abandoned to the fury of the populace; who, after a series of indignities, dragged it to the common gallows, to which they chained it by the feet, the head being cut off and carried to the queen-mother; who, it is said, caused it to be embalmed and sent to Rome. The king himself went to see the body hang upon the gibbet; where a fire being kindled under it, part was burnt, and the rest scorched. In the Louvre the gentlemen belonging to the king of Navarre and the prince of Condé were murdered under the king's eye. Two of them wounded, and pursued by the assassins, fled into the bed-chamber of the queen of Navarre, and jumped upon her bed, beseeching her to save their lives; and as she went to ask this favour of the queen-mother, two more, under the like circumstances, rushed into the room, and threw themselves at her feet. The queen-mother came to the window to enjoy these dreadful scenes; and the king, seeing the Protestants who lodged on the other side of the river, flying for their lives, called for his long gun, and fired upon them. In the space of three or four days, many thousands were destroyed in the city of Paris, by the most cruel deaths which malice itself could invent. Peter Ramus, professor of philosophy and mathematics, after being robbed of all he had, his belly being first ripped open, was thrown out of a window. This so much affected Denis Lambin the king's professor, that, though a zealous Catholic, he died of terror. The first two days, the king denied it was done by his orders, and threw the whole blame on the house of Guise: but, on the 28th of August, he went to the parliament, avowed it, was complimented upon it, and directed a process against the admiral, by which he was stigmatized as a traitor. Two innocent gentlemen suffered as his accomplices in a pretended plot against the life of the king, in order to set the crown on the head of the prince of Condé. They were executed by torch-light; and the king and the queen-mother (with the king of Navarre and the prince of Condé by force) were spectators of this horrid fact; and they also assisted at the jubilee to thank God for the execution of such an infamous design.

This massacre was not confined to the city of Paris alone. On the eve of St Bartholomew, orders had been sent to the governors of provinces to fall upon the Protestants themselves, and to let loose the people upon them: and though an edict was published before the end of the week, assuring them of the king's protection, and that he by no means designed to exterminate them because of their religion, yet private orders were sent, of a nature directly contrary; in consequence of which, the massacre, or (as, in allusion to the Sicilian vespers*, it was now styled) the *Matins of Paris*, were repeated in Meaux, Orleans, Troyes, Angers, Tholouse, Rouen, and Lyons; so that in the space of two months 30,000 Protestants were butchered. The next year Rochelle, the only strong fortress which the Protestants held in France, was besieged, but was not taken without the loss of 24,000 of the Catholics who besieged it. After this a pacification ensued on terms

favourable to the Protestants, but to which they never trusted.

This year the duke of Anjou was elected king of Poland, and soon after set out to take possession of his new kingdom. The king accompanied him to the frontiers of the kingdom; but during the journey was seized with a slow fever, which from the beginning had a very dangerous appearance. He lingered for some time under the most terrible agonies both of body and mind; and at last died on the 30th of May 1572, having lived 24 years, and reigned 13. It is said, that after the dreadful massacre abovementioned, this prince had a fierceness in his looks and a colour in his cheeks which he never had before. He slept little, and never found. He waked frequently in agonies, and had lost music to compose him again to rest.

143
Death of
Charles IX.

During the first years of the reign of Henry III. who succeeded his brother Charles, the war with the Protestants was carried on with indifferent success on the part of the Catholics. In 1575, a peace was concluded, called by way of eminence the *Edict of Pacification*. It consisted of no fewer than 63 articles; the substance of which was, that liberty of conscience, and the public exercise of religion, were granted to the reformed, without any other restriction than that they should not preach within two leagues of Paris or any other part where the court was: Party-chambers were erected in every parliament, to consist of equal numbers of Catholics and Protestants, before whom all judgments were to be tried: The judgments against the admiral, and, in general, all who had fallen in the war or been executed, were reversed; and eight cautionary towns were given to the Protestants.

This edict gave occasion to the Guises to form an association in defence, as was pretended, of the Catholic religion, afterwards known by the name of the *Catholic League*. In this league, though the king was mentioned with respect, he could not help seeing that it struck at the very root of his authority: for, as the Protestants had already their chiefs, so the Catholics were, for the future, to depend entirely upon the chief of the league; and were, by the very words of it, to execute whatever he commanded, for the good of the cause, against any, without exception of persons. The king, to avoid the bad effects of this, by the advice of his council declared himself head of the league; and of consequence recommenced the war against the Protestants, which was not extinguished as long as he lived.

144
Catholic
League
formed.

The faction of the duke of Guise, in the mean time, took a resolution of supporting Charles cardinal of Bourbon, a weak old man, as presumptive heir of the crown. In 1584 they entered into a league with Spain, and took up arms against the king: and though peace was concluded the same year, yet in 1587 they again proceeded to such extremities, that the king was forced to fly from Paris. Another reconciliation was soon after effected; but it is generally believed that the king from this time resolved on the destruction of Guise. Accordingly, finding that this nobleman still behaved towards him with his usual insolence, the king caused him to be stabbed, as he was coming into his presence, by his guards, on the 23d of December 1587. The king himself did not long survive him; being stabbed by one James Clement, a Jacobine

*See Sicily

France. 146 Duke of Guise murdered, and likewise the king.

cobine monk, on the first of August 1588. His wound at first was not thought mortal: but his frequent swooning quickly discovered his danger; and he died next morning, in the 39th year of his age, and 16th of his reign.

Before the king's death, he nominated Henry Bourbon king of Navarre for his successor on the throne of France; but as he was a Protestant, or at least one who greatly favoured their cause, he was at first owned by very few except those of the Protestant party. He met with the most violent opposition from the members of the Catholic league; and was often reduced to such straits, that he went to people's houses under colour of visits, when in reality he had not a dinner in his own. By his activity and perseverance, however, he was at last acknowledged throughout the whole kingdom, to which his abjuration of the Protestant religion contributed not a little. As the king of Spain had laid claim to the crown of France, Henry no sooner found himself in a fair way of being firmly seated on the throne, than he formally declared war against that kingdom; in which he at last proved successful, and in 1597 entered upon the quiet possession of his kingdom.

147 Henry IV.

The king's first care was to put an end to the religious disputes which had so long distracted the kingdom. For this purpose, he granted the famous edict, dated at Nantes, April 13. 1598. It re-established, in a most solid and effectual manner, all the favours that had ever been granted to the reformed by other princes; adding some which had not been thought of before, particularly the allowing them a free admission to all employments of trust, profit, and honour; the establishing chambers in which the members of the two religions were equal; and the permitting their children to be educated without constraint in any of the universities. Soon after, he concluded peace with Spain upon very advantageous terms. This gave him an opportunity of restoring order and justice throughout his dominions; of repairing all the ravages occasioned by the civil war; and abolishing all those innovations which had been made, either to the prejudice of the prerogatives of the crown or the welfare of the people. His schemes of reformation, indeed, he intended to have carried beyond the boundaries of France. If we may believe the duke of Sully, he had in view no less a design than the new-modelling of all Europe. He imagined that the European powers might be formed into a kind of Christian republic, by rendering them as nearly as possible of equal strength; and that this republic might be maintained in perpetual peace, by bringing all their differences to be decided before a senate of wise, disinterested, and able judges: and then he thought it would be no difficult matter to overturn the Ottoman empire. The number of these powers was to be 15; viz. the Papacy; the empire of Germany; France; Spain; Hungary; Great Britain; Bohemia; Lombardy; Poland; Sweden; Denmark; the republic of Venice; the States-General; the Swiss Cantons; and the Italian commonwealth, which was to comprehend the states of Florence, Geneva, Lucca, Modena, Parma, Mantua, and Monaco. In order to render the states equal, the empire was to be given to the duke of Bavaria; the kingdom of Naples to the pope; that of

148 Edict of Nantes.

149 The king proposes to new-model the European powers.

Sicily to the Venetians; Milan to the duke of Savoy, who, by this acquisition, was to become king of Lombardy; the Austrian Low Countries were to be added to the Dutch republic; Franche Comte, Alsace, and the country of Trent, were to be given to the Swiss. With a view, it is now thought, of executing this grand project, but under pretence of reducing the exorbitant power of the house of Austria, Henry made immense preparations both by sea and land; but if he really had such a design, he was prevented by death from attempting to execute it. He was stabbed in his coach by one Ravilliac, on the 12th of May 1608.

On the death of Henry IV. the queen-mother assumed the regency. Ravilliac was executed, after suffering horrid tortures. It is said that he made a confession, which was so written by the person who took it down, that not one word of it could ever be read, and thus his instigators and accomplices could never be discovered. The regency, during the minority of Louis XIII. was only remarkable for cabals and intrigues of the courtiers. In 1617, the king assumed the government himself, banished the queen-mother to Blois, caused her favourite marshal d'Ancre to be killed, and chose for his minister the famous cardinal Richelieu. In 1620, a new war broke out between the Catholics and Protestants, which was carried on with the greatest fury on both sides; and we may judge of the spirit which actuated both parties, by what happened at Negrepelisse, a town in Quercy. This place was besieged by the king's troops, and it was resolved to make an example of the inhabitants. The latter, however, absolutely refused to surrender upon any terms. They defended themselves, therefore, most desperately; and the city being at last taken by storm, they were all massacred, without respect of rank, sex, or age, except ten men. When these were brought into the king's presence, he told them they did not deserve mercy: they answered, that they would not receive it; that the only favour they asked, was to be hanged on trees in their own gardens; which was granted, and the place reduced to ashes. Both parties soon became weary of such a destructive war; and a peace was concluded in 1621, by which the edict of Nantes was confirmed. This treaty, however, was of no long duration. A new war broke out which lasted till the year 1628, when the edict of Nantes was again confirmed; only the Protestants were deprived of all their cautionary towns, and consequently of the power of defending themselves in time to come. This put an end to the civil wars on account of religion in France. Historians say, that in these wars above a million of men lost their lives; that 150,000,000 livres were spent in carrying them on; and that 9 cities, 400 villages, 2000 churches, 2000 monasteries, and 10,000 houses, were burnt or otherwise destroyed during their continuance. The next year, the king was attacked with a slow fever which nothing could allay, an extreme depression of spirits, and prodigious swelling in his stomach and belly. The year after, however, he recovered, to the great disappointment of his mother, who had been in hopes of regaining her power. She was arrested; but found means to escape into Flanders, where she remained during the rest of this reign. Richelieu, by a masterly train of politics, though himself was next to an enthusiast for popery, supported the

Protestants.

France.

150 He is murdered.

151 Louis XIII.

France.

Protestants of Germany and Gustavus Adolphus against the house of Austria; and after quelling all the rebellions and conspiracies which had been formed against him in France, he died some months before Louis XIII. in 1643.

¹⁵²
Louis XIV.

Louis XIV. surnamed *le Grand*, succeeded to the throne when he was only five years of age. During his minority, the kingdom was torn in pieces under the administration of his mother Anne of Austria, by the factions of the great, and the divisions between the court and parliament, for the most trifling causes, and upon the most despicable principles. The prince of Condé shined like a blazing star; sometimes a patriot, sometimes a courtier, and sometimes a rebel. He was opposed by the celebrated Turenne, who from a Protestant had turned Papist. The nation of France was involved at once in civil and domestic wars; but the queen-mother having made choice of cardinal Mazarine for her first minister, he found means to turn the arms even of Cromwell against the Spaniards, and to divide the domestic enemies of the court so effectually among themselves, that when Louis assumed the reins of government into his own hands, he found himself the most absolute monarch that had ever sat upon the throne of France. He had the good fortune, on the death of Mazarine, to put the domestic administration of his affairs into the hands of Colbert, who formed new systems for the glory, commerce, and manufactures of France, all which he carried to a surprising height. The king himself, ignorant and vain, was blind to every patriotic duty of a king, promoting the interests of his subjects only that they might the better answer the purposes of his greatness: and by his ambition he embroiled himself with all his neighbours, and wantonly rendered Germany a dismal scene of devastation. By his impolitic and unjust revocation of the edict of Nantes in the year 1685, with the dragooning* the protestants that followed it, he obliged them to take shelter in England, Holland, and different parts of Germany, where they established the silk manufactories, to the great prejudice of their own country. He was so blinded by flattery, that he arrogated to himself the divine honours paid to the pagan emperors of Rome. He made and broke treaties for his convenience: and in the end he raised against himself a confederacy of almost all the other princes of Europe; at the head of which was king William III. of England. He was so well served, that he made head for some years against this alliance; and France seemed to have attained the highest pitch of military glory, under the conduct of those renowned generals Condé and Turenne. (See UNITED PROVINCES.) At length, having provoked the English by his repeated infidelities, their arms under the duke of Marlborough, and those of the Austrians under prince Eugene, rendered the latter part of Louis's life as miserable as the beginning of it was splendid. His reign, from the year 1702 to 1711, was one continued series of defeats and calamities; and he had the mortification of seeing those places taken from him, which, in the former part of his reign, were acquired at the expence of many thousand lives. (See BRITAIN, n° 342, &c.)—Just as he was reduced, old as he was, to the desperate resolution of collecting his people and dying at their head, he was saved by the English Tory ministry de-

N° 131.

serting the cause, withdrawing from their allies, and concluding the peace of Utrecht in 1713. See BRITAIN, n° 371, &c.

The last years of Louis XIV. were also embittered by domestic calamities; which, added to those he had already endured of a public nature, impressed him with a deep melancholy. He had been for some time afflicted with a fistula; which, though successfully cut, ever afterwards affected his health. The year before the peace, his only son, the duke of Burgundy, died, together with the dukes and their eldest son; and the only remaining child was left at the point of death. The king himself survived till the month of September 1715; but on the 14th of that month expired, leaving the kingdom to his great-grandson Louis, then a minor.

By the last will of Louis he had devolved the regency, during the minority of the young king, upon a council, at the head of which was the duke of Orleans. That nobleman, however, disgusted with a disposition which gave him only a casting vote, appealed to the parliament of Paris, who set aside the will of the late king, and declared him sole regent. His first acts were extremely popular, and gave the most favourable ideas of his government and character. He restored to the parliament the right which had been taken from them of remonstrating against the edicts of the crown, and compelled those who had enriched themselves during the calamities of the former reign to restore their wealth. He also took every method to efface the calamities occasioned by the unsuccessful wars in which his predecessor had engaged; promoted commerce and agriculture; and, by a close alliance with Great Britain and the United Provinces, seemed to lay the foundation of a lasting tranquillity. This happy prospect, however, was soon overcast by the intrigues of Alberoni the Spanish minister, who had formed a design of recovering Sardinia from the emperor, Sicily from the duke of Savoy, and of establishing the Pretender on the throne of Britain. To accomplish these purposes, he negotiated with the Ottoman Porte, Peter the Great of Russia, and Charles XII. of Sweden; the Turks intending to resume the war against the emperor; the two latter to invade Great Britain. But as long as the duke of Orleans retained the administration of France, he found it impossible to bring his schemes to bear. To remove him, therefore, he fomented divisions in the kingdom. An insurrection took place in Brittany; and Alberoni sent small parties in disguise into the country, in order to support the insurgents, and even laid plots to seize the regent himself. All of a sudden, however, the Spanish minister found himself disappointed in every one of his schemes. His partisans in France were put to death; the king of Sweden was killed at Frederickshall in Norway; the Czar, intent on making new regulations, could not be persuaded to make war upon Britain; and the Turks refused to engage in a war with the emperor, from whom they had lately suffered so much. The cardinal, nevertheless, continued his intrigues; which quickly produced a war betwixt Spain on the one part, and France and Britain on the other. The Spaniards, unable to resist the union of two such formidable powers, were soon reduced to the necessity of suing for peace; and the terms were dictated

France.

¹⁵³
Louis XV.

¹⁵⁴
Administration of the duke of Orleans.

* See Dragooning.

France. tated by the regent of France; and of these the dis-
 mission of Alberoni the Spanish minister was one. A
 double marriage was now set on foot: the duke of
 Orleans gave his own daughter, Mademoiselle Mont-
 pensier, to Don Lewis prince of Asturias, while the
 infanta of Spain was betrothed to her cousin the king
 of France. From this time the house of Bourbon
 continued united; both princes being convinced, that
 it was their interest not to waste their strength in wars
 against each other.

155 Destructive project of John Law.
 The spirit of conquest having now in a great measure
 subsided, and that of commerce taken place through-
 out the world in general, France became the scene of
 as remarkable a project in the commercial way as ever
 was known in any country. One John Law, a Scot-
 sman, having been obliged to fly from his own country
 for murder, laid the plan of a company which might
 by its notes pay off the debt of the nation, and reim-
 burse itself by the profits. Law had wandered through
 various parts of Europe, and had successively endeav-
 oured to engross the attention of various courts. The
 proposal was made to Victor Amadeus king of Sicily;
 but he dismissed Law with a reply, that "he was not
 rich enough to ruin himself:" but in France it was
 looked upon in a more favourable light; the nation be-
 ing at this time involved in a debt of 200 millions,
 and the regent, as well as the people in general, very
 fond of embarking in new schemes. The bank, thus
 established, proceeded at first with some degree of
 caution; but having by degrees extended their credit
 to more than 80 times their real stock, they soon be-
 came unable to answer the demands made upon them;
 so that the company was dissolved the very same year
 in which it had been instituted. The confusion into
 which the kingdom was thrown by this fatal scheme,
 required the utmost exertions of the regent to put a
 stop to it; and scarcely was this accomplished when
 the king, in 1723, took the government into his own
 hands. The duke then became minister; but did not
 long enjoy this post. His irregularities had broken
 his constitution, and brought on a number of ma-
 ladies, under which he in a short time sunk, and
 was succeeded in his administration by the duke of
 Bourbon Conde. The king, as we have already re-
 marked, had been married, when very young, to the
 infanta of Spain, though by reason of his tender years
 the marriage had never been completed. The prin-
 cess, however, had been brought to Paris, and for
 some time treated as queen of France; but as Louis
 grew up, it was easy to see that he had contracted an
 inveterate hatred against the intended partner of his
 bed. The minister, therefore, at last consented that
 the princess should be sent back; an affront so much
 resented by the queen her mother, that it had almost
 produced a war betwixt the two nations.

157 The Infanta of Spain sent back.
 The dissolution of the marriage of Louis was the
 last act of Conde's administration; and the procuring
 of a new match was the first act of his successor Car-
 dinal Fleury. The princess pitched upon was the
 daughter of Stanislaus Leszczinski, king of Poland,
 who had been deposed by Charles XII. of Sweden.
 The princess was destitute of personal charms, but of
 an amiable disposition; and though it is probable that
 she never possessed the love of her husband, her excel-
 lent qualities could not but extort his esteem; and the

birth of a prince soon after their marriage removed all
 the fears of the people concerning the succession.

Cardinal Fleury continued the pacific schemes pur-
 sued by his predecessors; though they were somewhat
 interrupted by the war which took place in the year
 1733. Notwithstanding the connection betwixt that
 monarch and the French nation, however, Fleury was
 so parsimonious in his assistance, that only 1500 fol-
 diers were sent to relieve Dantzic, where Stanislaus
 himself resided, and who at that time was besieged by
 the Russians. This pitiful reinforcement was soon
 overwhelmed by a multitude of Russians; and Stanislaus
 was at last obliged to renounce all thoughts of the
 crown of Poland, though he was permitted to retain
 the title of king: and that this title might not be
 merely nominal, the king of France consented to be-
 stow upon him the duchies of Bar and Lorraine; so
 that, after the death of Stanislaus, these territories
 were indissolubly united to the dominions of France.
 Fleury steadily pursued his pacific plans, and the dis-
 putes between Spain and England in 1737 very little
 affected the peace of that kingdom; and it must be
 remembered to his praise, that instead of fomenting
 the quarrels betwixt the neighbouring potentates, he
 laboured incessantly to keep them at peace. He re-
 conciled the Genoese and Corsicans, who were at war;
 and his mediation was accepted by the Ottoman Porte,
 who at that time carried on a successful war with the
 emperor of Germany, but made peace with him at
 the intercession of the cardinal. All his endeavours
 to preserve the general peace, however, proved at last
 ineffectual. The death of the emperor Charles VI. in
 1740, the last prince of the house of Austria, set all
 Europe in a flame. The emperor's eldest daughter,
 Maria Theresa, claimed the Austrian succession, which
 comprehended the kingdoms of Hungary and Bohe-
 mia, the duchy of Silesia, Austrian Suabia, Upper
 and Lower Austria, Styria, Carinthia, Carniola; the
 four forest towns; Burgaw; Brissgaw; the Low Coun-
 tries; Friuli; Tyrol; the duchy of Milan; and the
 duchies of Parma and Placentia. Among the many
 competitors who pretended a right to share, or wholly
 to inherit, these extensive dominions, the king of
 France was one. But as he wished not to awaken the
 jealousy of the European princes by preferring direct-
 ly his own pretensions, he chose rather to support those
 of Frederic III. who laid claim to the duchy of Sile-
 sia. This brought on the war of 1740; and of which
 an account is given under the articles BRITAIN and
 PRUSSIA. It was terminated in 1748 by the treaty
 of Aix-la-Chapelle; but to this Louis, who secretly
 meditated a severe vengeance against Britain, only con-
 sented, that he might have time to recruit his fleet
 and put himself somewhat more upon an equality with
 that formidable power. But while he meditated great
 exploits of this kind, the internal tranquillity of the
 kingdom was disturbed by violent disputes betwixt the
 clergy and parliaments of France. In the reign of
 Louis XIV. there had been violent contests betwixt the
 the Jansenists and Jesuits concerning free-will and other
 obscure points of theology; and the opinions of the
 Jansenists had been declared heretical by the celebra-
 ted papal bull named *Unigenitus*; the reception of which
 was enforced by the king, in opposition to the parlia-
 ments, the archbishop of Paris, and the body of the
 people.

France.

159 Disputes be-
 twixt the
 parliaments
 and clergy.

France.

people. The archbishop, with 15 other prelates, protested against it as an infringement of the rights of the Gallican church, of the laws of the realm, and an insult on the rights of the people themselves. The duke of Orleans favoured the bull by inducing the bishops to submit to it; but at the same time stopped a persecution which was going on against its opponents. Thus matters passed over till the conclusion of the peace; a short time after which the jealousy of the clergy was awakened by an attempt of the minister of state to inquire into the wealth of individuals of their order. To prevent this, they revived the contest about the bull Unigenitus; and it was resolved, that confessional notes should be obtained of dying persons; that these notes should be signed by priests who maintained the authority of the bull; and that, without such notes, no person could obtain a viaticum, or extreme unction. On this occasion the new archbishop of Paris, and the parliament of that city, took opposite sides; the latter imprisoning such of the clergy as refused to administer the sacraments excepting in the circumstances above mentioned. Other parliaments followed the example of that of Paris; and a war was instantly kindled betwixt the civil and ecclesiastical departments of the state. In this dispute the king interfered, forbade the parliaments to take cognizance of ecclesiastical proceedings, and commanded them to suspend all prosecutions relative to the refusal of the sacraments: but instead of acquiescing, the parliament presented new remonstrances, refused to attend any other business, and resolved that they could not obey this injunction without violating their duty as well as their oath. They cited the bishop of Orleans before their tribunal, and ordered all writings, in which its jurisdiction was disputed, to be burnt by the executioner. By the assistance of the military, they enforced the administration of the sacraments to the sick, and ceased to distribute that justice to the subject for which they had been originally instituted. The king, enraged at their obduracy, arrested and imprisoned four of the members who had been most obstinate, and banished the remainder to Bourges, Poitiers, and Auvergne; while, to prevent any impediment from taking place in the administration of justice by their absence, he issued letters patent, by which a royal chamber for the prosecution of civil and criminal suits was instituted. The counsellors refused to plead before these new courts; and the king, finding at last that the whole nation was about to fall into a state of anarchy, thought proper to recall the parliament. The banished members entered Paris amidst the acclamations of the inhabitants; and the archbishop, who still continued to encourage the priests in refusing the sacraments, was banished to his seat at Conflans; the bishops of Orleans and Troyes were in like manner banished, and a calm for the present restored to the kingdom.

160
Parliament
of Paris ban-
ished.

161
New dis-
putes be-
twixt the
king and
parliament.

The tranquillity thus established was of no long duration. In the year 1756, the parliament again fell under the displeasure of the king by their imprudent persecution of those who adhered to the bull Unigenitus. They proceeded so far in this opposition as to refuse to register certain taxes absolutely necessary for the carrying on of the war. By this Louis was provoked, that he suppressed the fourth and fifth chambers of inquests, the members of which had distin-

guished themselves by their opposition to his will. He commanded the bull Unigenitus to be respected, and prohibited the secular judges from ordering the administration of the sacraments. On this 15 counsellors of the great chamber resigned their offices, and 124 members of the different parliaments followed their example; and the most grievous discontents took place throughout the kingdom. An attempt was made by a fanatic, named *Damien*, to assassinate him; and the king was actually wounded, though slightly, between the ribs, in the presence of his son and in the midst of his guards. The assassin was put to the most exquisite tortures; in the midst of which he persisted, in the most obstinate manner, to declare that he had no intention to kill the king; but that his design was only to wound him, that God might touch his heart, and incline him to restore peace to his dominions, &c. These expressions, which undoubtedly indicated insanity, had no effect on his merciless judges, who consigned him to one of the most horrid deaths the ingenuity or cruelty of man could invent. This attempt, however, seems to have had some effect upon the king, as he soon after banished the archbishop of Paris, who had been recalled, and accommodated matters with his parliament once more.

The unfortunate event of the war of 1755 had brought the nation to the brink of ruin, when Louis implored the assistance of Spain; and on this occasion the celebrated *Family Compact* was signed; by which, with the single exception of the American trade, the subjects of France and Spain are naturalized in both kingdoms, and the enemy of the one sovereign is invariably to be looked upon as the enemy of the other. At that time, however, the assistance of Spain availed very little; both powers were reduced to the lowest ebb, and the arms of Britain were triumphant in every quarter of the globe. See the article *BRITAIN*.

The peace concluded at Paris in the year 1763, though it freed the nation from a most destructive and bloody war, did not restore its internal tranquillity. The parliament, eager to pursue the victory they had formerly gained over their religious enemies, now directed their efforts against the Jesuits, who had obtained and enforced the bull Unigenitus. That once powerful order, however, was now on the brink of destruction. A general detestation of its members had taken place throughout the whole world. A conspiracy formed by them against the king of Portugal, and from which he narrowly escaped, had roused the indignation of Europe, and this was still farther inflamed by some fraudulent practices of which they had been guilty in France. Le Valette, the chief of their missionaries at Martinico, had, ever since the peace of Aix-la Chapelle, carried on a very extensive commerce, insomuch that he even aspired at monopolizing the whole West India trade when the war with Britain commenced in 1755. Leonay and Gouffie, merchants at Marseilles, in expectation of receiving merchandise to the value of two millions from him, had accepted of bills drawn by the Jesuits to the amount of a million and an half. Unhappily they were disappointed by the vast number of captures made by the British; in consequence of which they were obliged to apply to the Society of Jesuits at large: but they, either ignorant of their true interest, or too slow in giving assistance,

France.

162

Family
compact
between
France and
Spain esta-
blished.

163

Expulsion of
the Jesuits.

France. ance, suffered the merchants to stop payment; and thus not only to bring ruin upon themselves, but to involve, as is usual in such cases, a great many others in the same calamity. Their creditors demanded indemnification from the society at large; and on their refusal to satisfy them, brought their cause before the parliament of Paris. That body, eager to revenge themselves on such powerful adversaries, carried on the most violent persecutions every where against them. In the course of these, the volume containing the constitution and government of the order itself was appealed to, and produced in open court. It then appeared, that the order of Jesuits formed a distinct body in the state, submitting implicitly to their chief, who alone was absolute over their lives and fortunes. It was likewise discovered that they had, after a former expulsion, been admitted into the kingdom upon conditions which they had never fulfilled; and to which their chief had obstinately refused to subscribe; consequently that their existence at that time in the nation was merely the effect of toleration. The event was, that the writings of the Jesuits were pronounced to contain doctrines subversive of all civil government, and injurious to the security of the sacred persons of sovereigns; the attempt of Damien against the king was attributed to them, and every thing seemed to prognosticate their speedy dissolution. In this critical moment, however, the king interfered, and by his royal mandate suspended all proceedings against them for a year; a plan of accommodation was drawn up, and submitted to the pope and general of the order: but the latter, by his ill-timed haughtiness, entirely overthrew the hope of reconciliation. The king withdrew his protection, and the parliament redoubled their efforts against them. The bulls, briefs, constitutions, and other regulations of the Society, were determined to be encroachments on authority, and abuses of government; the Society itself was finally dissolved, and its members declared incapable of holding any clerical or municipal offices; their colleges were seized; their effects confiscated; and the order annihilated ever since.

164
Contenti-
ons betwixt
the king
and his par-
lements.

The parliament, having gained this victory, next made an attempt to fet bounds to the power of the king himself. They now refused to register an edict which Louis had issued for the continuance of some taxes which should have ended with the war, and likewise to conform to another by which the king was enabled to redeem his debts at an inadequate price. The court attempted to get the edicts registered by force, but the parliaments every where seemed inclined to resist to the last. In 1766, the parliament of Brittany refused the crown a gift of 700,000 livres; in consequence of which they were singled out to bear the weight of royal vengeance: but while matters were on the point of coming to extremities, the king thought proper to drop the process altogether, and to publish a general amnesty. The parliaments, however, now affected to despise the royal clemency; which exasperated the king to such a degree, that he ordered the counsellors of the parliament of Brittany (who had refused to resume the functions of which he deprived them) to be included in the list of those who were to be drafted for militia; and those upon whom the lot fell were immediately obliged to join their respective regi-

ments; the rest being employed in forming the city-guard. The parliament of Paris remonstrated so freely upon this conduct of the king, that they also fell under his censure; and Louis in the most explicit manner declared, that he would suffer no earthly power to interfere with his will; and the parliaments were for the present intimidated into submission.

The interval of domestic tranquillity which now took place, was employed by the king in humbling the pride of the pope, who refused to recal a brief he had published against the duke of Parma. On this the French monarch reclaimed the territories of Avignon and Venaissin; and while the pontiff denounced his unavailing censures against him, the marquis de Rochecouart, with a single regiment of soldiers, drove out the troops of the pope, and took possession of the territories in question.

A more formidable opposition was made by the natives of the small island of Corfica; the sovereignty of which had been transferred to France by the Genoese its former masters, on condition that Louis should re-instate them in the possession of the island of Capraia, which the Corficans had lately reduced. These islanders defended themselves with the most desperate intrepidity; and it was not till after two campaigns, in which several thousands of the bravest troops of France were lost, that they could be brought under subjection.

The satisfaction which this unimportant conquest might afford to Louis, was clouded by the distresses of the nation at large. The East India Company had totally failed, and most of the capital commercial houses in the kingdom were involved in the same calamity. The minister, the duc de Choiseul, by one desperate stroke, reduced the interest of the funds to one half, and at the same time took away the benefit of the survivorship in the tontines, by which the national credit was greatly affected; the altercation betwixt the king and his parliaments revived, and the dissensions became worse than ever. The duc de Choiseul attempted in vain to conciliate the differences; his efforts tended only to bring misfortunes upon himself, and in 1771 he was banished by the king, who suspected him of favouring the popular party too much; and this was soon after followed by the banishment of the whole parliament of Paris, and that by the banishment of a number of others; new parliaments being every where chosen in place of those who had been expelled. The people were by no means disposed to pay the same regard to these new parliaments that they had done to the old ones; but every appearance of opposition was at last silenced by the absolute authority of the king. In the midst of this plenitude of power, however, which he had so ardently desired, his health daily declined, and the period of his days was evidently at no great distance. As he had all along indulged himself in sensual pleasures to the greatest excess, so now they proved the immediate means of his destruction. His favourite mistress, Madame de Pompadour, who for a long time governed him with an absolute sway, had long since been dead, and the king had for some time been equally enslaved by the charms of Madame du Barre. At last even her beauty proved insufficient to excite desire; and a succession of mistresses became necessary to rouse the languid appetites of the king. One

France.

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Island of
Corfica re-
duced.

166

Distressed
state of the
nation.

France.

167
Death of
Louis XV.
168
Reign of
Louis XVI.

of these, who was infected with the small-pox, communicated the disease to the king; who in a short time died of it, notwithstanding all the assistance that could be given him by the physicians.

The new king Louis XVI. grandson to the former, ascended the throne in the year 1774, in the 20th year of his age; and to secure himself against the disease which had proved fatal to his predecessor, submitted to inoculation, with several others of the royal family. Their quick and easy recovery contributed much to extend that practice throughout the kingdom, and to remove the prejudices which had been entertained against it.

The king had no sooner regained his health, than he applied himself diligently to extinguish the differences which had taken place betwixt his predecessor and the people. He removed those from their employments who had given cause of complaint by their arbitrary and oppressive conduct; and he conciliated the affection of his subjects by removing the new parliaments and recalling the old ones.

But though the prudence of Louis had suggested to him these compliances, he endeavoured still to preserve pure and entire the royal authority. He explained his intentions by a speech in the great chamber of parliament. "The step that he had taken to ensure the tranquillity and happiness of his subjects, ought not (he observed) to invalidate his own authority; and he hoped, from the zeal and attachment of the present assembly, an example of submission to the rest of his subjects. Their repeated resistance to the commands of his grandfather had compelled that monarch to maintain his prerogative by their banishment; and they were now recalled, in the expectation that they would quietly exercise their functions, and display their gratitude by their obedience." He concluded with declaring, "That it was his desire to bury in oblivion all past grievances; that he should ever behold with extreme disapprobation whatever might tend to create divisions and disturb the general tranquillity; and that his chancellor would read his ordinance to the assembly, from which they might be assured he would not suffer the smallest deviation to be made." That ordinance was conceived in the most explicit terms, and was immediately registered by the king's command. The articles of it limited within very narrow bounds the pretensions of the parliament of Paris: The members were forbidden to look upon themselves as one body with the other parliaments of the kingdom, or to take any step, or assume any title, that might tend towards, or imply, such an union: They were enjoined never to relinquish the administration of public justice, except in cases of absolute necessity, for which the first president was to be responsible to the king; and it was added, that on their disobedience the Grand Council might replace the parliament, without any new edict for the purpose. They were still however permitted to enjoy the right of remonstrating before the registering of any edicts or letters patent which they might conceive injurious to the welfare of the people, provided they preserved in their representations the respect due to the throne. But these remonstrances were not to be repeated; and the parliament, if they proved ineffectual, were to register the edict objected to within a month at farthest from the first day of its

being published: They were forbidden to issue any arrests which might excite trouble, or in any manner retard the execution of the king's ordinances; and they were assured by the king himself, at the conclusion of this code for their future conduct, that as long as they adhered to the bounds prescribed, they might depend upon his countenance and protection. In short, the terms on which Louis consented to re-establish the parliaments were such, that they were reduced to mere cyphers, and the word of the king still continued to be the only law in the kingdom. The archbishop of Paris, who had likewise presumed to raise some commotions with regard to the bull *Unigenitus*, was obliged to submit; and severely threatened if he should afterwards interfere in such a cause.

The final conquest of the Corsicans, who, provoked by the oppression of their governors, had once more attempted to regain their former liberty, was the first event of importance which took place after this restoration of tranquillity: but the kingdom was yet filled with disorder from other causes. A scarcity of corn happening to take place just at the time that some regulations had been made by M. Turgot the new financier, the populace rose in great bodies, and committed such outrages, that a military force became absolutely necessary to quell them; and it was not till upwards of 500 of these miserable wretches were destroyed that they could be reduced. The king, however, by his prudent and vigorous conduct on this occasion, soon put a stop to all riots, and eminently displayed his clemency as well as prudence in the methods he took for the restoration of the public tranquillity.

The humanity of Louis was next shown in an edict which he caused to be registered in parliament, sentencing the deserters from his army in future to work as slaves on the public roads, instead of punishing them as formerly with death; and with equal attention to the general welfare of his subjects, he seized the moment of peace to fulfil those promises of economy which on his accession he had given to his people. Various regulations took place in consequence; particularly the suppression of the *Musquetaires* and some other corps, which being adapted more to the parade of guarding the royal person than any real military service, were supported at a great expence, without any adequate return of benefit to the state.

Particular attention was also paid to the state of the marine; and the appointment of M. de Sartiné in 1776 to that department did honour to the penetration of the sovereign. That minister, fruitful in resources, and unwearied in his application, was incessantly engaged in augmenting the naval strength of his country; and the various preparations that filled the ports and docks created no small uneasiness to the British court.

The next appointment made by the king was equally happy, and in one respect singular and unprecedented. M. Turgot, though possessed of integrity and industry, had not been able to command the public confidence. On his retreat, M. Clugny, intendant-general of Bourdeaux, had been elevated to the vacant post: but he dying in a very short space, M. Taboureaux des Reaux was appointed his successor; and the king soon after associated with him in the management of the

France.

1775.

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Humane
edict in fa-
vour of de-
serters.

170

Suppression
of the Mu-
squetaires.

171

Appoint-
ment of M.
Necker to
the direc-
tion of the
finances.

France. the finances M. Necker, by birth a Swiss, and by religion a Protestant. That gentleman, in the preceding reign, had been chosen to adjust some differences between the East India company and the crown; and had discharged his trust in a manner which gained the approbation of both parties. Possessed of distinguished abilities, his appointment would have excited no surprise, had it not been contrary to the constant policy of France, which had carefully excluded the aliens of her country and faith from the control of her revenue. It now stood forward as a new instance of enlargement of mind and liberality of sentiment; and will to posterity mark the prominent features of the reign of Louis XVI.

172 The French privately assist the Americans in their contest with Britain; Although the French monarch was of a pacific disposition, and not destitute of generosity of sentiment; yet his own and the public exultation had been openly and constantly proportioned to the success of the Americans in their contest with Britain: the princes of the blood and the chief nobility were eager to embark in support of the cause of freedom; and the prudence of the king and his most confidential ministers alone restrained their ardour. The fatal events of the former war were still impressed on the mind of Louis; and he could not readily consent to expose his infant marine in a contest with a nation who had so frequently asserted the dominion of the seas, and so lately broken the united strength of the house of Bourbon. At the same time, he was sensible that the opportunity of humbling those haughty islanders should not be entirely neglected, and that some advantages should be taken of the present commotions in America. Two agents from the United States, Silas Deane and Dr Benjamin Franklin, had successively arrived at Paris; and though all audience was denied them in a public capacity, still they were privately encouraged to hope that France only waited the proper opportunity to vindicate in arms the independence of America. In the mean while, the American cruizers were hospitably received into the French ports; artillery and all kinds of warlike stores were freely sold or liberally granted to the distress of the colonists; and French officers and engineers, with the connivance of government, entered into their service.

Some changes were about this time introduced into the different departments of state. The conduct of M. Necker in the finances had been attended with universal approbation; and M. Taboureaux des Reaux, his colleague, had resigned his situation, but still retained the dignity of counsellor of state. To afford full scope to the genius of M. Necker, Louis determined no longer to clog him with an associate; but, with the title of Director-general of the Finances, submitted to him the entire management of the funds and revenue of France. In the ensuing year, the count de St Germain, secretary at war, died; and the prince de Montbarey, who had already filled an inferior situation in that department, was now appointed to succeed him.

In the mean time, Louis's negotiations with foreign courts were not neglected. He concluded a new treaty of alliance with Switzerland; vigilantly observed the motions of the different princes of Germany on the death of the elector of Bavaria; and when closely questioned by the English ambassador Lord Stormont, respecting the various warlike preparations which were

France. diligently continued through the kingdom, he replied, That at a time when the seas were covered with English fleets and American cruizers, and when such armies were sent to the New World as had never before appeared there, it became prudent for him also to arm for the security of the colonies and the protection of the commerce of France. The king was not ignorant at the same time, that the remonstrances of Great Britain, and the importunities of the agents of the United States, would soon compel him to adopt some decisive line of conduct. This was hastened by a new event disastrous to Britain; the failure of general Burgoyne's expedition, and the capture of his army. The news of that event was received at Paris with unbounded exultation. M. Sartine, the marine superintendent, was eager to measure the naval strength of France with that of Great Britain; the queen, who had long seconded the applications of the American agents, now espoused their cause with fresh ardour; and the pacific inclinations of Louis being overborne by the suggestions of his ministers and the influence of his queen, it was at length determined openly to acknowledge the independence of the United States.

Dr Franklin and Silas Deane, who had hitherto acted as private agents, were now acknowledged as public ambassadors from those states to the court of Versailles; and a treaty of amity and commerce was signed between the two powers in the month of February 1778. The duke of Noailles, ambassador to the court of London, was in the month of March instructed to acquaint that court with the above treaty. At the same time he declared, that the contracting parties had paid great attention not to stipulate any exclusive advantages in favour of France, and that the United States had reserved the liberty of treating with every nation whatever on the same footing of equality and reciprocity. But this stipulation was treated by the British with contempt; and the recall of Lord Stormont, their ambassador at Versailles, was the signal for the commencement of hostilities.—The events produced by this war are related under the articles AMERICA, BRITAIN, and INDOSTAN. Here our chief business is with domestic transactions, the measures of the cabinet, and the internal economy of the state.

In the year 1780, new changes in the French ministry took place. M. Bertin had resigned the office of secretary of state; the prince de Montbarey had retired from the post of secretary at war, and was succeeded by the marquis de Segur. But the most important removal was that of M. Sartine, who had for several years presided over the marine department, and whose unwearied application and ability had raised the naval power of France to a height that astonished Europe: but his colleagues in the cabinet loudly accused a profusion, which would have diverted into one channel the whole resources of the kingdom; and his retreat opened a road to the ambition of the marquis de Castries, who was appointed to supply his place.

This year, the king fixed on the anniversary of his birth-day to render it memorable by a new instance of humanity; and he abolished for ever the inhuman custom of putting the question, as it was called, by torture; a custom which had been so established by the practice of ages, that it seemed to be an inseparable part of the

173 And at last openly acknowledge the independence of the United States.

174 Removal of M. de Sartine.

France.

the constitution of the courts of justice in France. At the same time, to defray the charges of war, he continued to diminish his own expenditure; and sacrificing his magnificence to the ease of his subjects, dismissed at once above 400 officers belonging to his court.

1775
Dismissal
of M. Neck-
er.

Unhappily, however, the popular discontents were excited next year by the dismissal of their favourite minister M. Necker. He had conceived the arduous but popular project of supporting a war by loans without taxes; and the rigid economy which he had introduced into all the departments of the royal household, and the various resources that presented themselves to his fertile genius, had supported him amidst the difficulties that attended this system. But his austerity of temper had not rendered him equally acceptable to the sovereign and his subjects; and the repeated reforms he had recommended were represented as inconsistent with the dignity of the crown; he was therefore in 1781 dismissed from his office of comptroller-general; and M. Joli de Fleuri, counsellor of state, was appointed to that important department. The defeat of the count de Grasse happened next year, and impressed the kingdom with general grief and consternation. Immense preparations were, however, made for the operations of 1783; and in conjunction with the courts of Madrid and the Hague, Louis was determined this year to make the most powerful efforts to bring the war to a conclusion. But in the midst of these preparations, the voice of peace was again heard; and Louis was induced to listen to the proffered mediation of the two first potentates in Europe, the emperor of Germany and the empress of Russia. The count de Vergennes, who still occupied the post of secretary of foreign affairs, was appointed to treat with Mr Fitzherbert the British minister at Brussels, but who had lately proceeded to Paris to conduct this important negotiation. The way was already smoothed for the restoration of the public tranquillity, by provisional articles signed at the conclusion of the last year between the States of America and Great Britain, and which were to constitute a treaty of peace finally to be concluded when that between France and Great Britain took place. Preliminary articles were accordingly agreed upon and signed at Versailles: these were soon after succeeded by a definitive treaty; and France, throughout her extensive dominions, beheld peace once more established. Though the late war had been attended by the most brilliant success, and the independence of America seemed to strike deep at the source of her rival's power, yet France herself had not been entirely free from inconvenience. The retreat of M. Necker had, as we have already observed, diminished the public confidence; three different persons who had since transiently occupied his post, increased the jealousies of the people; and the failure of the celebrated Caisse d'Escompte completed the universal consternation.

1777
Of the
Caisse d'Es-
compte.

That bank had been established in the year 1776. The plan of it was formed by a company of private adventurers, and its capital was fixed at L.500,000 Sterling. The professed design of the Company was to discount bills at short dates, at the rate of four *per cent. per annum*: but as this interest could never be an equivalent for the capital sunk by the proprietors, they were entrusted with the additional power of issuing notes to the amount of their capital, which, as they

were capable at any time of being converted into specie, might be often voluntarily taken by their customers from mere convenience. The reputation of the bank soon caused its stock to sell above par; and its credit was still at the highest, when to the astonishment of the nation it suddenly stopped payment on the 2d of October 1783. The cause assigned was an uncommon scarcity of specie: But the public suspected that the failure arose from a loan secretly made to government; and what confirmed the suspicion was, that government about the same time stopped payment of the bills drawn upon them by their army in America.

Whatever was the cause of this event, the king was prevailed on to extend his protection to the company. By four successive edicts the banks in Paris were ordered to receive the notes of the Caisse d'Escompte as currency; and a lottery with a stock of one million Sterling, redeemable in eight years, being established, the tickets were made purchasable in notes of the Caisse d'Escompte. By these expedients the public confidence in that bank was revived, its business increased, and its stock rose to above double the original subscription; the bills from America were at the same time put in a train of payment, and public credit was restored throughout the kingdom. Some compensation also for the expences that had been incurred during the late war, was drawn from a treaty with the United States of America. These engaged to reimburse France in the sum of 18 million of livres, which had been advanced in the hour of their distress; and Louis consented to receive the money, as more convenient to the States, in the space of 12 years, by 12 equal and annual payments.

The general peace was soon after followed by a particular treaty between France and Holland, which was effected with great address by the Count de Vergennes. It included all the principles which can serve to cement in the closest union distinct nations under distinct governments; and by which they may mutually participate, in peace or in war, of good or of evil; and in all cases administer the most perfect aid, counsel, and succour to each other. It also prescribed, if their united good offices for the preservation of peace should prove ineffectual, the assistance they were to afford each other by sea and land. France was to furnish Holland with 10,000 effective infantry, 2000 cavalry, with 12 ships of the line and 6 frigates. Their High Mightinesses, on the other side, in case of a marine war, or that France should be attacked by sea, were to contribute to her defence 4 ships of the line and three frigates; and in case of an attack on the territory of France, the States-general were to have the option of furnishing their land contingent either in money or troops, at the estimate of 5000 infantry and 1000 cavalry. Further, if the stipulated succours should be insufficient for the defence of the party attacked, or for procuring a proper peace, they engaged to assist each other with all their forces, if necessary; it being however agreed that the contingent of troops to be furnished by the States-general should not exceed 20,000 infantry and 4000 cavalry. It was further added, that neither of the contracting powers should disarm, or make or receive proposals of peace or truce, without the consent of the other: they promised also not to contract any future alliance or engagement what-

France.

1778
Treaty be-
tween
France and
Holland.

ever,

France. ever, directly or indirectly, contrary to the present treaty; and on any treaties or negotiations being proposed which might prove detrimental to their joint interest, they pledged their faith to give notice to each other of such proposals as soon as made.

Thus was Holland now converted into the firm ally of that power against whose encroaching spirit she had formerly armed the most powerful kingdoms of Europe; while France having asserted the independence of America against Great Britain, and having converted an ancient and formidable foe into an useful friend, seemed to have attained an influence over the nations of the earth that she had never before been possessed of.

But however exalted her present situation might appear, the seeds of future commotion were already apparent to an attentive observer. The applause that had attended the parliament of Paris in their struggles with the late king might be considered as the first dawn of freedom; the language of that assembly had boldly inculcated to their countrymen their natural rights, and taught them to look with a less enraptured eye on the lustre that encompassed the throne. The war in America had contributed to enlarge the political ideas of the French: they had on that occasion stood forth as the champions of liberty, in opposition to regal power; and the officers, who had acted on that conspicuous theatre, accustomed to think and speak without restraint, on their return imparted to the provinces of France the flame of freedom which had been kindled in the wilds of America. From that moment the French, instead of silently acquiescing under the edicts of their sovereign, canvassed each action with bold and rigid impartiality; while the attachment of the army, which has ever been considered as the sole foundation of despotism, gave way to the noble enthusiasm of liberty.

We have already noticed the public dissatisfaction that had attended the dismissal of M. Necker; his transient successor, M. de Fleury, had retired from the management of the finances in 1783, and the more transient administration of M. d'Ormesson had expired in the same year that gave it birth. On his retreat, M. de Calonne, who had successively filled with acknowledged reputation the office of intendant of Mentz, and afterwards of the provinces of Flanders and Artois, was nominated to the post of comptroller-general. This gentleman, flexible and insinuating, eloquent in conversation and polished in his manners, fertile in resources and liberal in the disposal of the public money, soon rendered himself acceptable to the sovereign. But he did not enter upon his new and arduous station favoured by the breath of popularity: he was reported to be more able than consistent, and not to have tempered the ardour of his spirit by the severity of deep research; and the people, amidst repeated loans, regretted that severe simplicity which had characterised the administration of M. Necker.

It was the bold and judicious measures of Calonne, however, that restored credit to the Caisse d'Escompte, which had stopped payment a few weeks before his accession. His next measure, in 1784, the establishment of the Caisse d'Amortissement or sinking fund, was intitled to a still higher degree of applause. The plan of that fund was simple and moderate: It was to pay annually by government, into the hands of a board set

apart for that purpose, the entire interest of the national debts, whether in stock or annuities, together with an additional sum of L. 120,000. The annuities that would be extinguished every year were estimated at L. 50,000; and in that proportion, the sum set apart for the redemption of the national debt would annually increase. The operation of this new fund was limited to the term of 25 years; and during that term the annual receipt of the Caisse d'Amortissement is declared unalterable, and incapable of being diverted to any other object.

The principal measure of the next year was the establishment of a new East India Company, the constitutions of which have been already detailed in a preceding volume of this work, under the article COMPANY; see Vol. V. p. 247, 248: A measure not equally commendable with the preceding, and which did not fail to excite violent complaints. The time, however, was now approaching, when the necessities of the state would compel him to measures still more unpopular, and destined to undergo a severer scrutiny. Although peace had been re-established throughout Europe for three years, yet the finances of France seemed scarce affected by this interval of tranquillity, and it was found requisite to close every year with a loan. The public expenditure of 1785 might probably seem to sanction this measure. It had been thought proper to fortify Cherbourg upon a large and magnificent scale; the claim of the emperor to the navigation of the Scheldt, had obliged the French to increase their land forces, either to form a respectable neutrality, or to assist effectually their Dutch allies; and the marquis de Castries, fond of war and profuse in his designs, had not suffered the navy, which M. Sartine had surrendered into his hands, to decline during the interval of peace. The treaty of commerce concluded in the year 1786 with Great Britain was a new source of discontent. Though regarded by the English manufacturers as far from advantageous, it excited in France still louder murmurs. It was represented as likely to extinguish those infant establishments, which were yet unable to vie with the manufactures of England that had attained to maturity; and the market that it held out for the wines and oils of France was passed over in silence, while the distress of the artisan was painted in the most striking colours. But when the edict for registering the loan at the conclusion of the last year, and which amounted to the sum of three millions three hundred and thirty thousand pounds, was presented to the parliament of Paris, the murmurs of the people, through the remonstrances of that assembly, assumed a more legal and formidable aspect. The king however signified to the select deputation that were commissioned to convey to him their remonstrances, that he expected to be obeyed without farther delay. The ceremony of the registering accordingly took place on the next day; but it was accompanied with a resolution, importing, "that public economy was the only genuine source of abundant revenue, the only means of providing for the necessities of the state, and restoring that credit which borrowing had reduced to the brink of ruin."

The king was no sooner informed of this step, than he commanded the attendance of the grand deputation of parliament; when he erased from their records the

France.

France.

the resolution that had been adopted; and observed, that though it was his pleasure that the parliament should communicate, by its respectful representations, whatever might concern the good of the public, yet he never would allow them so far to abuse his clemency as to erect themselves into the censors of his government. At the same time, more strongly to mark his displeasure at their expostulations, he superseded one of their officers, who had appeared most active in forwarding the obnoxious resolution.

M. de Calonne, however, though gratified by the approbation of his sovereign, could not but feel himself deeply mortified by the opposition of the parliament. His attempts to conciliate that assembly had proved ineffectual; and he experienced their inflexible aversion at the critical juncture when their acquiescence might have proved of the most essential service. An anxious inquiry into the state of the public finances had convinced him that the expenditure by far exceeded the revenue. In this situation, to impose new taxes was impracticable; to continue the method of borrowing was ruinous; to have recourse only to economical reforms, would be found wholly inadequate; and he hesitated not to declare, that it would be impossible to place the finances on a solid basis, but by the reformation of whatever was vicious in the constitution of the state.

To give weight to this reform, M. de Calonne was sensible that something more was necessary than the royal authority; he perceived that the parliament was neither a fit instrument for introducing a new order into public affairs, nor would submit to be a passive machine for sanctioning the plans of a minister, even if those plans were the emanations of perfect wisdom. Though originally a body of lawyers, indebted for their appointments to the king, there was not an attribute of genuine legislative assembly but what they seemed desirous to engross to themselves; and they had been supported in their pretensions by the plaudits of the people, who were sensible that there was no other body in the nation that could plead their cause against royal or ministerial oppression. To suppress, therefore, the only power of control that remained, and to render the government more arbitrary, was deemed too perilous a measure: yet to leave the parliament in the full possession of their influence, an influence that the minister was convinced would be exerted against him, was at once to render his whole system abortive.

In this dilemma, the only expedient that suggested itself was to have recourse to some other assembly, more dignified and solemn in its character, and which should in a greater degree consist of members from the various orders of the state and the different provinces of the kingdom. This promised to be a popular measure; it implied a deference to the people at large, and might be expected to prove highly acceptable. But the true and legitimate assembly of the nation, the states-general, had not met since the year 1614; nor could the minister flatter himself with the hope of obtaining the royal assent to a meeting which a despotic sovereign could not but regard with secret jealousy. Another assembly had occasionally been substituted in the room of the states-general: this was distinguished by the title of the *Notables*; and consisted of a num-

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Assembly
of the No-
tables.

N^o 131.

ber of persons from all parts of the kingdom, chiefly selected from the higher orders of the state, and nominated by the king himself. This assembly had been convened by Henry IV. again by Louis XIII. and was now once more summoned by the authority of the present monarch.

The writs for calling them together were dated on the 29th of December 1786; and they were addressed to seven princes of the blood, nine dukes and peers of France, eight field-marschals, twenty-two nobles, eight counsellors of state, four masters of requests, eleven archbishops and bishops, thirty-seven of the heads of the law, twelve deputies of the *pays d'états*, the lieutenant civil, and twenty-five magistrates of the different towns of the kingdom. The number of members was 144; and the 29th of January 1787 was the period appointed for their meeting.

Upon the arrival of the Notables at Paris, however, the minister found himself yet unprepared to submit his system to their inspection, and postponed the opening of the council to the 7th of February. A second delay to the 14th of the same month was occasioned by the indisposition of M. de Calonne himself, and that of the count de Vergennes president of the council of finance and first secretary of state; and a third procrastination was the necessary result of the death of the count on the day previous to that fixed for the opening of the meeting. He was succeeded in the department of foreign affairs by the count de Montmorin, a nobleman of unblemished character. But his loss at this critical juncture was severely felt by M. de Calonne; he alone, of all the ministers, having entered with warmth and sincerity into the plans of the comptroller-general. The chevalier de Miro-mesnil, keeper of the seals, was avowedly the rival and enemy of that statesman. The marschal de Castries, secretary for the marine department, was personally attached to M. Necker; and the baron de Breteuil, secretary for the household, was the creature of the queen, and deeply engaged in what was called the Austrian system.

It was under these difficulties that M. de Calonne, on the 22d of February, first met the assembly of the Notables, and opened his long expected plan. He began by stating, that the public expenditure had for centuries past exceeded the revenue, and that a very considerable deficiency had of course existed; that the Mississippi scheme of 1720 had by no means, as might have been expected, restored the balance; and that under the economical administration of cardinal Fleury the deficit still existed; that the progress of this derangement under the last reign had been extreme; the deficiency amounting to three millions sterling at the appointment of the abbé Terray; who, however, reduced it to one million six hundred and seventy-five thousand pounds; it decreased a little under the short administrations that followed, but rose again in consequence of the war, under the administration of M. Necker; and at his own accession to office, it was three millions three hundred and thirty thousand pounds.

In order to remedy this growing evil, M. Calonne recommended a territorial impost, in the nature of the England land-tax, from which no rank or order of men were to be exempted; and an enquiry into the possessions

France.

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Splendid
project of
M. de Ca-
lonne.

France.

possessions of the clergy, which hitherto had been deemed sacred from their proportion of the public burdens: the various branches of internal taxation were also to undergo a strict examination; and a considerable resource was presented in mortgaging the demesne lands of the crown.

The very necessity for these reforms was combated with a degree of boldness and force of reasoning that could not fail of deeply impressing the assembly; and instead of meeting with a ready acquiescence, the comptroller-general was now lanced into the boundless ocean of political controversy. M. Necker, previous to his retirement, had published his *Compte rendu au Roi*, in which France was represented as possessing a clear surplus of 425,000 pounds sterling: this performance had been read with avidity, and probably contributed to estrange from the author the royal countenance; but the credit of it was ably vindicated by M. de Brienne archbishop of Thoulouse.

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Opposed by
Mirabeau
and the bi-
shop of
Thoulouse:

M. de Calonne met with a still more formidable adversary in the count de Mirabeau. This extraordinary man, restless in his disposition, licentious in his morals, but bold, penetrating, and enterprising, had occasionally visited every court in Europe. He had been admitted at one time to the confidence of the minister; and had been directed, though in no ostensible character, to observe at Berlin the disposition of the successor of the great Frederic: in this capacity he was frequently exposed to neglect and disappointment; his letters were often left unanswered; disgust succeeded to admiration; and he who had entered the Prussian court the intimate friend, returned to Paris the avowed enemy, of M. de Calonne: While the archbishop arraigned the understanding, the count impeached the integrity, of the comptroller-general.

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And by the
principal
nobility,
clergy, and
magi-
strates.

The eloquence of M. de Calonne, however, might have successfully vindicated his system and reputation against the calculations of Brienne, and the invectives of Mirabeau; but he could not support himself against the influence of the three great bodies of the nation. The ancient nobility and the clergy had ever been free from all public assessments; and had the evil gone no farther, it might have been still perhaps borne with patience; but through the shameful custom of selling patents of nobility, such crowds of new noblesse started up, that every province in the kingdom was filled with them. The first object with those who had acquired fortunes rapidly, was to purchase a patent; which, besides gratifying their vanity, afforded an exemption to them and their posterity from contributing proportionably to the exigencies of the state; the magistracies likewise throughout the kingdom enjoyed their share of these exemptions; so that the whole weight of the taxes fell on those who were least able to bear them.

The minister's design, then, of equalizing the public burdens, and by rendering the taxes general diminishing the load borne by the lower and most useful classes of people, though undoubtedly great and patriotic, at once united against him the nobility, the clergy, and the magistracy; and the event was such as might be expected: the intrigues of those three bodies raised against him so loud a clamour, that finding it impossible to stem the torrent, he not only resigned his

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place on the 12th of April, but soon after retired to England from the storm of persecution.

In the midst of these transactions at home, Louis's attention was also called to the state of affairs in the republic of Holland, his new and close ally. The prince of Orange had been stripped of all authority by the aristocratic party; and, retiring from the Hague, maintained the shadow of a court at Nimeguen. His brother-in-law, however, the new king of Prussia, exerted his endeavours to promote the interests of the stadtholder; and having offered, in concert with France, to undertake the arduous task of composing the differences which distracted the republic, the proposal was received with apparent cordiality by the court of Versailles. At the same time it could scarce be expected that France would become the instrument of restoring the prince of Orange to that share of power which he had before occupied, and thus abandon one of the longest and most favourite objects of her policy, the establishing a supreme and permanent controul in the affairs of Holland. In fact, the conditions which were framed by the Louvestein faction, as the basis of reconciliation, were such as plainly indicated their design to reduce the influence and authority of the stadtholder within very narrow limits. On his renouncing his right of filling up the occasional vacancies in the town senates, he was to be restored to the nominal office of captain-general: but he was to be restrained from marching the troops into or out of any province, without leave from the respective provinces concerned; and he was also to subscribe to a resolution passed some time before by the senate of Amsterdam, that the command should at all times be revocable at the pleasure of the states. Had the prince acquiesced in these preliminaries, France would have completely attained the object of her long negotiations, and by means of the Louvestein faction have acquired the ascendancy that she had repeatedly sought in the councils of Holland. But under the difficulties that surrounded him, the prince of Orange was admirably supported and assisted by the genius, the spirit, and the abilities of his consort: she firmly rejected every measure tending to abridge any rights that had been attached to the office of stadtholder; and M. de Rayneval, the French negotiator, having in vain endeavoured to overcome her resolution, broke off the correspondence between the Hague and Nimeguen, and returned to Paris about the middle of January 1787.

The events that ensued will be found detailed under a subsequent article. It is only necessary to observe in this place, that the republican party were totally disappointed in their hopes from France. The court of Versailles had indeed long trusted to the natural strength of the republican party, and had been assiduous of the during the whole summer in endeavouring to second them by every species of succours that could be privately afforded. Crowds of French officers arrived daily in Holland; and either received commissions in the service of the states, or acted as volunteers in their troops. Several hundreds of tried and experienced soldiers were selected from different regiments; and being furnished with money for their journey, and assurances of future favour, were dispatched in small parties to join the troops, and help to discipline the burghers

France.

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Upon
which M.
de Calonne
resigns.

186
Disturbances
in Hol-
land.

187
Attempts
of the
French to
support the
republican
party.

France. burghers and volunteers. A considerable corps of engineers were also directed to proceed silently and in disguise towards Amsterdam, and to assist in strengthening the works of that city. These aids, which might have proved effectual had the contest been confined to the states of Holland and the stadtholder, were overwhelmed in the rapid invasion of the Prussians; and the court of Berlin had taken its measures with so much celerity, and the situation of the republicans was already become so desperate, that it was doubtful whether their affairs could be restored by any assistance that France was capable of immediately administering. Yet on Great Britain sitting out a strong squadron of men of war at Portsmouth to give confidence to the operations of the king of Prussia, the court of Versailles also sent orders to equip 16 sail of the line at Brest, and recalled a small squadron which had been commissioned on a summer's cruise on the coast of Portugal. But in these preparations Louis seemed rather to regard his own dignity, than to be actuated by any hopes of effectually relieving his allies. All opposition in Holland might be already considered as extinguished. The states assembled at the Hague had officially notified to the court of Versailles, that the disputes between them and the stadtholder were now happily terminated; and as the circumstances which gave occasion for their application to that court no longer existed, so the succours which they had then requested would now be unnecessary.

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Domestic
concerns of
France.

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Assembly
of the No-
tables dis-
solved.

Under these circumstances, France could only wish to extricate herself from her present difficulty with honour. She therefore readily listened to a memorial from the British minister at Paris; who proposed, in order to preserve the good understanding between the two crowns, that all warlike preparations should be discontinued, and that the navies of both kingdoms should be again reduced to the footing of a peace establishment. This was gladly acceded to by the court of Versailles; and that harmony which had been transiently interrupted between the two nations was restored.

Though the French king could not but sensibly feel the mortification of thus relinquishing the ascendancy which he had attained in the councils of Holland, the state of his own domestic concerns and the internal situation of his kingdom furnished matter for more serious reflection. The dismissal of M. de Calonne had left France without a minister, and almost without a system; and though the king bore the opposition of the Notables with admirable temper, yet the disappointment that he had experienced sunk deep into his mind. Without obtaining any relief for his most urgent necessities, he perceived too late that he had opened a path to the restoration of the ancient constitution of France, which had been undermined by the crafty Louis XI. and had been nearly extinguished by the daring and sanguinary counsels of Richlieu under Louis XIII. The Notables had indeed demeaned themselves with respect and moderation, but at the same time they had not been deficient in firmness. The appointment of the archbishop of Thoulouse, the vigorous adversary of M. de Calonne, to the office of comptroller-general, probably contributed to preserve the appearance of good humour in that assembly; yet

the proposed territorial impost, or general land-tax, which was an object so ardently coveted by the court, was rejected. Louis, therefore, deprived of any farther hope of rendering the convention subservient to his embarrassments, determined to dissolve the assembly; which he accordingly did, with a very moderate and conciliatory speech to the members on their dismissal.

Thus disappointed of the advantage which he had flattered himself he would have drawn from the acquiescence of the Notables, the king was obliged now to recur to the usual mode of raising money by the royal edicts; among the measures proposed for which purpose were the doubling of the poll-tax, the re-establishment of the third twentieth, and a stamp-duty. But the whole was strongly disapproved by the parliament of Paris; and that assembly, in the most positive terms, refused to register the edict. Louis was obliged to apply, as the last resort, to his absolute authority; and, by holding what is called a *bed of justice*, compelled them to enroll the impost.

The parliament, though defeated, were far from subdued; and on the day after the king had held his bed of justice, they entered a formal protest against the edict; declaring, "that it had been registered against their approbation and consent, by the king's express command; that it neither ought nor should have any force; and that the first person who should presume to attempt to carry it into execution, should be adjudged a traitor, and condemned to the galleys." This spirited declaration left the king no other alternative, than either proceeding to extremities in support of his authority, or relinquishing for ever after the power of raising money upon any occasion without the consent of the parliament. Painful as every appearance of violence must have proved to the mild disposition of Louis, he could not consent to surrender, without a struggle, that authority which had been so long exercised by his predecessors. Since the commencement of the present discontents, the capital had been gradually filled with considerable bodies of troops; and about a week after the parliament had entered the protest, an officer of the French guards, with a party of soldiers, went at break of day to the house of each individual member, to signify to him the king's command, that he should immediately get into his carriage, and proceed to Troyes, a city of Champagne, about 70 miles from Paris, without writing or speaking to any person out of his own house before his departure. These orders were served at the same instant; and before the citizens of Paris were acquainted with the transaction, their magistrates were already on the road to their place of banishment.

Previous to their removal, however, they had presented a remonstrance on the late measures of government, and the alarming state of public affairs. In stating their opinions on taxes, they declared, that neither the parliaments, nor any other authority, excepting that of the three estates of the kingdom collectively assembled, could warrant the laying of any permanent tax upon the people; and they strongly enforced the renewal of those national assemblies, which had rendered the reign of Charlemagne so great and illustrious.

This requisition of the parliaments to re-establish the

France.

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Refusal of
the parlia-
ment to re-
gister the
new taxes.

191
The mem-
bers ba-
nished.

France. the national council, or states-general, was the more honourable, as the former assemblies must have sunk under the influence of the latter, and returned to their original condition of mere registers and courts of law. The confidence and attachment of the people of consequence rose in proportion to this instance of disinterestedness; their murmurs were openly expressed in the streets of the capital, and the general dissatisfaction was augmented by the step that was put to public business by the exile of the parliament.

The cabinet at the same time was apparently weak, disunited, and fluctuating; and continual changes took place in every department of the state. Louis, averse to rigorous counsels, wished to allay the growing discontent by every concession that was consistent with his dignity; but it was generally believed, that the queen strongly dissuaded him from any step that might tend to the diminution of the royal authority. The influence of that princess in the cabinet was undoubtedly great: but the popularity, which once had accompanied her was no more; and some imputations of private levity, which had been rumoured through the capital, were far from rendering her acceptable to the majority of the people; while the count d'Artois, the king's brother, who had expressed himself in the most ungarded terms against the conduct of the parliament, stood exposed to all the consequences of popular hatred.

Nor was it only in the capital that the flame of liberty once more burst forth; it blazed with equal strength in the provincial parliaments. Among various instances of this nature, the parliament of Grenoble passed a decree against *lettres de cachet*, the most odious engine of arbitrary power; and declared the execution of them within their jurisdiction, by any person, and under whatever authority, to be a capital crime.

The king had endeavoured to soothe the Parisians by new regulations of economy, and by continual retrenchments in his household; but these instances of attention, which once would have been received with the loudest acclamations, were now disregarded under their affliction for the absence of their parliament. His majesty, therefore, in order to regain the affections of his subjects, consented to restore that assembly; abandoning at the same time the stamp-duty and the territorial impost, which had been the sources of dispute. These measures were, however, insufficient to establish harmony between the court and the parliament. The necessities of the state still continued; nor could the deficiency of the revenue be supplied but by extraordinary resources, or a long course of rigid frugality. About the middle of November 1787, in a full meeting of the parliament, attended by all the princes of the blood and the peers of France, the king entered the assembly, and proposed two edicts for their approbation: one was for a new loan of 450 millions, near 19 millions sterling: the other was for the re-establishment of the Protestants in all their ancient civil rights; a measure which had long been warmly recommended by the parliament, and which was probably now introduced to procure a better reception to the loan.

On this occasion, the king delivered himself in a speech of uncommon length, filled with professions of regard for the people, but at the same time strongly expressive of the obedience he expected to his edicts.

Louis probably imagined, that the dread of that banishment from which the members had been so lately recalled, would have ensured the acquiescence of the assembly; but no sooner was permission announced for every member to deliver his sentiment, than he was convinced that their spirits remained totally unsubdued. An animated debate took place, and was continued for nine hours; when the king, wearied by perpetual opposition, and chagrined at some freedoms used in their debates, suddenly rose, and commanded the edict to be registered without further delay. This measure was most unexpectedly opposed by the duke of Orleans, first prince of the blood; who, considering it as an infringement of the rights of parliament, protested against the whole proceedings of the day as being thereby null and void. Though Louis could not conceal his astonishment and displeasure at this decisive step, he contented himself with repeating his orders; and immediately after, quitting the assembly, retired to Versailles. On the king's departure, the parliament confirmed the protest of the duke of Orleans; and declared, that as their deliberations had been interrupted, they considered the whole business of that day as of no effect.

It was not to be supposed that Louis would suffer so bold an attack on his power with impunity. Accordingly a letter was next day delivered to the duke of Orleans, commanding him to retire to Villars Cotterel, one of his seats about 15 leagues from Paris, and to receive no company there except his own family; at the same time the Abbé Sabatier and M. Freteau, both members of the parliament, and who had distinguished themselves in the debate, were seized under the authority of *lettres de cachet*, and conveyed, the first to the castle of Mont St Michel in Normandy, the last to a prison in Picardy. This act of despotism did not fail immediately to rouse the feelings of the parliament. On the following day they waited on the king, and expressed their astonishment and concern that a prince of the blood royal had been exiled, and two of their members imprisoned, for having declared in his presence what their duty and consciences dictated, and at a time when his majesty had announced that he came to take the sense of the assembly by a plurality of voices. The answer of the king was reserved, forbidding, and unsatisfactory; and tended to increase the resentment of the parliament. At the same time, it did not prevent them from attending to the exigencies of the state; and convinced of the emergency, they consented to register the loan for 450 millions of livres, which had been the source of this unfortunate difference. This concession contributed to soften the mind of the king, and the sentence of the two magistrates was in consequence changed from imprisonment to exile; M. Freteau being sent to one of his country-seats, and the Abbé Sabatier to a convent of Benedictines.

The parliament however was not to be soothed by that measure to give up the points against which they had originally remonstrated. In a petition conceived with freedom, and couched in the most animated language, they boldly reprobated the late acts of arbitrary violence, and demanded the entire liberation of the persons against whom they had been exerted. We have already noticed the fluctuating counsels of the court of

3 K 2 Versailles;

France.

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Oppose the
edict for a
loan.

194
Duke of
Orleans
and two
members
banished.

195
Strong re-
monstrances
of the
parliament.

192
recalled.

France.
196
Duke of
Orleans re-
called.

Versailles; and that Louis, as often as he was left to pursue his own inclinations, adopted measures of reconciliation. On the present occasion, in the beginning of the year 1788, he recalled the duke of Orleans to court, who soon after obtained leave to retire to England; and he permitted the return of the abbé Sabatier and M. Freteau to the capital.

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New re-
monstran-
ces.

The parliament however had not confined their demands to the liberation of those gentlemen; but had also echoed the remonstrances of the parliament of Grenoble, and had loudly inveighed against the execution of *lettres de cachet*. These repeated remonstrances, mingled with personal reflections, seconded most probably the suggestions of the queen, and Louis was once more instigated to measures of severity. M. d'Espremevil and Monsambert, whose bold and pointed harangues had pressed most closely on the royal dignity, were doomed to experience its immediate resentment. While a body of armed troops surrounded the hotel in which the parliament were convened, Colonel Degout entered the assembly, and secured the persons of the obnoxious members, who were instantly conducted to different prisons. This new instance of arbitrary violence occasioned a remonstrance from parliament, which in boldness far exceeded all the former representations of that assembly. They declared they were now more strongly confirmed, by every proceeding, of the entire innovation which was aimed at in the constitution. "But, sire," added they, "the French nation will never adopt the despotic measures to which you are advised, and whose effects alarm the most faithful of your magistrates: we shall not repeat all the unfortunate circumstances which afflict us; we shall only represent to you with respectful firmness, that the fundamental laws of the kingdom *must* not be trampled upon, and that *your authority can only be esteemed so long as it is tempered with justice.*"

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Assembly
of the No-
tables.

Language so pointed and decisive, and which asserted the controlling power of the laws above the regal authority, could not fail of seriously alarming the king; and with a view to diminish the influence of parliament, it was determined again to convene the Notables. Accordingly, about the beginning of May, Louis appeared in that assembly; and after complaining of the excesses in which the parliament of Paris had indulged themselves, and which had drawn down his reluctant indignation on a few of the members, he declared his resolution, instead of annihilating them as a body, to recal them to their duty and obedience by a salutary reform. M. de la Moignon, as keeper of the seals, then explained his majesty's pleasure to establish a *cour plénière* or supreme assembly, to be composed of princes of the blood, peers of the realm, great officers of the crown, the clergy, marshals of France, governors of provinces, knights of different orders, a deputation of one member from every parliament, and two members from the chambers of council, and to be summoned as often as the public emergency, in the royal opinion, should render it requisite.

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Opposition
to the
king's pro-
posals.

If the assembly of the Notables listened in silent deference to the project of their sovereign, the parliament of Paris received it with every symptom of aversion. That body strongly protested against the establishment of any other tribunal; and declared their final resolution not to assist at any deliberations in the supreme

assembly which his majesty prepared to institute. A more unexpected mortification occurred to the king in the opposition of several peers of the realm: these expressed their regret at beholding the fundamental principles of the constitution violated; and while they were lavish in their professions of attachment to the person of their sovereign, concluded with apologizing for not entering on those functions assigned them in the plenary court, as being inconsistent with the true interests of his majesty, which were inseparable from those of the nation.

The flame quickly spread throughout the more distant provinces; at Rennes in Brittany, and Grenoble in Dauphiné, the people broke out into acts of the most daring outrage. In the latter city several hundreds of the inhabitants perished in a conflict with the military; they yet maintained their ground against the regulars; and the commanding officer, at the intreaties of the first president, readily withdrew his troops from a contest into which he had entered with reluctance. The different parliaments of the kingdom at the same time expressed their feelings in the most glowing language; and strongly urged the necessity of calling together the states-general, the lawful council of the kingdom, as the only means of restoring the public tranquillity.

Louis now plainly saw, that a compliance with the public wishes for the re-establishment of the states-general was absolutely necessary, in order to avoid the calamities of a civil war which impended upon his refusal. In that event he must have expected to have encountered the majority of the people, animated by the exhortations and example of their magistrates: the peers of the realm had expressed the strongest disapprobation of his measures; nor could he even depend any longer on the support of the princes of his blood; but what afforded most serious matter of alarm was the spirit lately displayed among the military, who, during the disturbances in the provinces, had reluctantly been brought to draw their swords against their countrymen; and many of whose officers, so recently engaged in establishing the freedom of America, publicly declared their abhorrence of despotism.

It was not, however, till after many a painful struggle that Louis could resolve to restore an assembly, whose influence must naturally overshadow that of the crown, and whose jurisdiction would confine within narrow limits the boundless power he had inherited from his predecessor. In the two preceding reigns, the states-general had been wholly discontinued; and though the queen-regent, during the troubles which attended the minority of Louis XIV. frequently expressed her intention of calling them together, she was constantly dissuaded by the representations of Mazarin. It is probable that the present monarch still flattered himself with the hope of being able to allure the members of that assembly to the side of the court; and having employed them to establish some degree of regularity in the finances, and to curb the spirit of the parliaments, that he would again have dismissed them to obscurity.

Under these impressions an arret was issued in August, fixing the meeting of the states-general to the first of May in the ensuing year; and every step was taken to secure the favourable opinion of the public during

France.

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Arret for
summon-
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states gene-
ral.

France.

France.

during the interval. New arrangements took place in the administration; and M. Necker, whom the confidence of the people had long followed, was again introduced into the management of the finances; the torture, which by a former edict had been restricted in part, was now entirely abolished; every person accused was allowed the assistance of counsel, and permitted to avail himself of any point of law; and it was decreed, that in future sentence of death should not be passed on any person, unless the party accused should be pronounced guilty by a majority at least of three judges.

The time appointed for the convention of the states-general was now approaching; and the means of assembling them formed a matter of difficult deliberation in the cabinet. The last meeting, in 1614, had been convened by application to the bailiwicks. But this mode was liable to several strong objections; the bailiwicks had been increased in number and jurisdiction, several provinces having since that period been united to France; and the numbers and quality of the members were no less an object of serious attention: it was not till the close of the year, therefore, that the proposal of M. Necker was adopted, which fixed the number of deputies at 1000 and upwards, and ordained that the representatives of the third estate or commons should equal in number those of the nobility and clergy united.

The eyes of all Europe were now turned on the states-general; but the moment of that assembly's meeting was far from auspicious: The minds of the French had long been agitated by various rumours; the unanimity that had been expected from the different orders of the states was extinguished by the jarring pretensions of each; and their mutual jealousies were attributed by the suspicions of the people to the intrigues of the court, who were supposed already to repent of the hasty assent which had been extorted. A dearth that pervaded the kingdom increased the general discontent; and the people, pressed by hunger, and inflamed by resentment, were ripe for revolt. The sovereign also, equally impatient of the obstacles he continually encountered, could not conceal his chagrin; while the influence of the queen in the cabinet was again established, and was attended by the immediate removal of M. Necker. The dismissal of that minister, so long the favourite of the public, was the signal of open insurrection: the Parisians assembled in myriads; the guards refused to oppose and stain their arms with the blood of their fellow-citizens; the count d'Artois and the most obnoxious of the nobility thought themselves happy in eluding by flight the fury of the insurgents; and in a moment a revolution was accomplished, the most remarkable perhaps of any recorded in history.

But that we may not take up room with an imperfect or dubious narration, we must defer giving any detail of particulars till some future opportunity, when the tide of innovation and reform now prevailing in that kingdom shall have subsided; and the government in one shape or another have attained a footing that promises to be durable. The objects of the revolution are many and arduous; and it is impossible to say, whether we may have yet to record their entire consummation; or to recount a new train of events

tending to shake the novel fabric, and to restore the puissance and the splendor of *royalty*, though the sceptre of *despotism* should be swayed no more. In short, it is wished to have an opportunity, not only of detailing the progress, but of surveying the final issue, of the event in question. Such an opportunity may perhaps be afforded by the time we arrive at the article REVOLUTION, where there will be occasion to advert to the principal events which under that denomination have formed eras in the history of different nations, and when of course this great era in the annals of France will claim a share of attention proportioned to its magnitude and importance.

The air in France is pure, healthy, and temperate. The kingdom is so happily seated in the middle of the temperate zone; that some make it equal to Italy, with regard to the delightfulness of the landscapes, and the fertility of the soil: however, it is certainly much more healthful. The soil produces corn, wine, oil, and flax, in great abundance; and they have very large manufactures of linen, woollen, silk, and lace. They have a foreign trade to Spain, Italy, Turkey, and to the East and West Indies. They themselves reckon that the number of the inhabitants is 20,000,000. The kingdom is watered by a great number of rivers; of which the four principal are, the Loire, the Seine, the Rhone, and the Garonne or Gironde. The monarchy was absolute before the late revolution; and the subjects were extremely devoted to their prince even under the greatest acts of oppression. The parliaments, for a long series of years past, had little or no share in the government; and their business was confined to the passing and registering the arrears or laws which the king was pleased to send them: however, they did not always pay a blind obedience to the king, and we have had frequent instances of their making a noble stand. In civil causes these parliaments were the last resort, provided the court did not interpose. That of Paris was the most considerable, where the king used often to come in person to see his royal acts recorded. It consisted of the dukes and peers of France (when dukes and peers existed), besides the ordinary members, who purchased their places; and they only took cognizance of causes belonging to the crown. The revenues of the crown arose from the taille or land-tax, and the aids which proceed from the customs and duties on all merchandize, except salt, the tax upon which commodity is called the *gabelles**: besides these, there were other taxes; as, the capitation or poll-tax; the tenths

Now abolished.
See Gabels.

of all estates, offices, and employments; besides the 15th penny, from which neither the nobility nor clergy were exempted. Add to these, the tenths and free-gifts of the clergy, who were allowed to tax themselves; and, lastly, crown-rents, fines, and forfeitures, which brought in a considerable sum. All these are said to have amounted to 15,000,000 Sterling a-year. But the king had other resources and ways of raising money, whenever necessity obliged him. The army, in time of peace, is said to consist of 200,000 men, and in time of war of 400,000; among whom are many Swiss, Germans, Scots, Irish, Swedes, and Danes. There was till lately no religion allowed in France but the Roman Catholic, ever since the revocation of the edict of Nantz in 1685; though they are not so devoted to the pope as other nations of that communion.

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France
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Franchise.

nor had they ever any inquisition among them. The Roman Catholic is still the established religion; but with ample toleration to the Protestants, who are now even not excluded from places of the highest trust in the state.

Isle of FRANCE, a province of France, so called, because it was formerly bounded by the river Seine, Marne, Oise, Aisne, and Ourque. It comprehends, besides Paris, the Beauvoisis, the Valois, the county of Senlis, the Vexin, the Hurepois, the Gatinois, the Multien, the Goele, and the Mantois. Paris is the capital.

FRANCESCA (Peter), an eminent Florentine painter of night-pieces and battles, was employed to paint the Vatican. He also painted portraits, and wrote on arithmetic and geometry. He died in 1458.

FRANCFORT *on the Main*, an Imperial and Hanseatic town of Franconia in Germany, where the emperors were formerly elected. It is a handsome, strong, and rich place, and has a great deal of commerce. Here the golden bull is preserved, which is the original of the fundamental laws of the empire. It is seated in a fine fertile plain; and well fortified with a double ditch, bastions, redoubts, and ravelins. The streets are remarkably wide, and the houses handsomely built. It has great conveniency for carrying on an extensive trade with the other parts of Germany, by means of the navigable river which runs throughout it. The suburbs is called *Saxon-hausen*, and joined to the town by a stone bridge built over the Main. E. Long. 8. 40. N. Lat. 49. 55.

FRANCFORT, *on the Oder*, a rich and handsome town of Germany, in the middle Marche of Brandenburg, formerly imperial, but now subject to the king of Prussia. E. Long. 15. 0. N. Lat. 52. 20.

FRANCHE-COMTE, a province of France, bounded on the south and west by Champagne and Burgundy; on the north by Lorraine; and to the east by the earldom of Mumplegard, and Switzerland. It is in length from north to south about 30 leagues; in breadth about 20. It is partly flat and partly hilly. The flat country is fruitful in grain, wine, hemp, and pasture; and the hilly country abounds in cattle, producing also some wine and corn, copper, lead, iron, and silver ores, mineral waters, and quarries of stone, marble, and alabaster.

FRANCHISE, in law. *Franchise* and *liberty* are used as synonymous terms; and their definition is, "a royal privilege, or branch of the king's prerogative, subsisting in the hands of a subject." Being therefore derived from the crown, they must arise from the king's grant; or, in some cases, may be held by prescription, which, as has been frequently said, presupposes a grant. The kinds of them are various, and almost infinite. We shall here briefly touch upon some of the principal; premising only, that they may be vested in either natural persons or bodies-politic; in one man, or in many: but the same identical franchise, that has before been granted to one, cannot be bestowed on another, for that would prejudice the former grant.

To be a county-palatine, is a franchise vested in a number of persons. It is likewise a franchise for a number of persons to be incorporated and subsist as a body-politic; with a power to maintain perpetual succession, and do other corporate acts: and each indivi-

dual member of such corporation is also said to have a franchise or freedom. Other franchises are, to hold a court-leet: to have a manor or lordship; or, at least, to have a lordship paramount: to have waifs, wrecks, estrays, treasure-trove, royal fish, forfeitures, and deodands: to have a court of one's own, or liberty of holding pleas and trying causes: to have the cognizance of pleas; which is a still greater liberty, being an exclusive right, so that no other court shall try causes arising within that jurisdiction: to have a bailiwick, or liberty exempt from the sheriff of the county; where in the grantee only, and his officers, are to execute all process: to have a fair or market; with the right of taking toll, either there or at any other public places, as at bridges, wharfs, or the like; which tolls must have a reasonable cause of commencement (as in consideration of repairs, or the like), else the franchise is illegal and void: or lastly, to have a forest, chase, park, warren, or fishery, endowed with privileges of royalty. See CHASE, FOREST, &c.

FRANCHISE is also used for an asylum or sanctuary, where people are secure of their persons, &c. Churches and monasteries in Spain are franchises for criminals; so were they anciently in England, till they were abused to such a degree that there was a necessity for abolishing the custom. One of the most remarkable capitulars made by Charlemagne in his palace of Heristal, in 779, was that relating to the franchises of churches. The right of franchise was held so sacred, that even the less religious kings observed it to a degree of scrupulousness; but to such excess in time was it carried, that Charlemagne resolved to reduce it. Accordingly he forbade any provision being carried to criminals retired into churches for refuge.

FRANCHISE of *Quarters*, is a certain space or district at Rome, wherein are the houses of the ambassadors of the princes of Europe; and where such as retire cannot be arrested or seized by the sbirri or sergeants, nor prosecuted at law. The people of Rome look on this as an old usurpation and a scandalous privilege, which ambassadors, out of a jealousy of their power, carried to a great length in the 15th century, by enlarging insensibly the dependencies of their palaces or houses, within which the right of franchise was anciently confined. Several of the popes, Julius III. Pius XIV. Gregory XIII. and Sixtus V. published bulls and ordinances against this abuse; which had refused so considerable a part of the city from their authority, and rendered it a retreat for the most abandoned persons. At length Innocent XI. expressly refused to receive any more ambassadors but such as would make a formal renunciation of the franchise of quarters.

FRANCIA (Francesco), a celebrated Bolognese painter, born in 1450. He was first a goldsmith or jeweller, afterwards a graver of coins and medals; but applying at last to painting, obtained great reputation by his works, particularly by a piece of St Sebastian, whom he had drawn bound to a tree with his hands tied over his head. He pined himself into a consumption, by despairing to equal Raphael; and died in 1518.

FRANCIS I. king of France, the rival of the emperor Charles V. and the restorer of learning and politeness in France. See (*History of*) FRANCE.

FRANCIS (Philip), a very ingenious writer, of Irish

Franchise
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Francis.

Franciscans.

Franciscans
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Frank.

extraction, if not born in that kingdom. His father was a dignified clergyman in Ireland, being dean of some cathedral; and our author, his son, was also bred to the church, and had a doctor's degree conferred on him. He was more distinguished as a translator than as an original writer. His versions of Horace and Demosthenes have been justly valued: the former is accompanied with notes, and is perhaps as complete and useful a work of its kind as hath yet appeared. He was also a considerable political writer; and in the beginning of the present reign is supposed to have been employed by the government: for which service, he was promoted to the rectory of Barrow in Suffolk, and to the chaplainship of Chelsea hospital. He was also the author of two tragedies, *Eugenia*, and *Constantia*; but, as a dramatic writer, not very successful. He died at Bath in March 1773; leaving a son, who was then one of the supreme council at Bengal.

FRANCISCANS, in ecclesiastical history, are religious of the order of St Francis, founded by him in the year 1209. Francis was the son of a merchant of Assisi, in the province of Umbria, who, having led a dissolute life, was reclaimed by a fit of sickness, and afterwards fell into an extravagant kind of devotion, that looked less like religion than alienation of mind. Soon after this, viz. in the year 1208, hearing the passage repeated, Matt. x. 9, 10. in which Christ addresses his apostles, *Provide neither gold, nor silver, &c.* he was led to consider a voluntary and absolute poverty as the essence of the gospel, and to prescribe this poverty as a sacred rule both to himself and to the few that followed him. This new society, which appeared to Innocent III. extremely adapted to the present state of the church, and proper to restore its declining credit, was solemnly approved and confirmed by Honorius III. in 1223, and had made a considerable progress before the death of its founder in 1226. Francis, through an excessive humility, would not suffer the monks of his order to be called *fratres*, i. e. brethren or friars, but *fratresculi*, i. e. little brethren, or friars-minor, by which denomination they still continue to be distinguished. They are also called *grey friars*, on account of the colour of their clothing, and *cordeliers*, &c. The Franciscans and Dominicans were zealous and active friends to the papal hierarchy, and, in return, were distinguished by peculiar privileges and honourable employments. The Franciscans, in particular, were invested with the treasure of ample and extensive indulgences; the distribution of which was committed to them by the popes, as a means of subsistence, and a rich indemnification for their voluntary poverty. In consequence of this grant, the rule of the founder, which absolutely prohibited both personal and collective property, so that neither the individual nor the community were to possess either fund, revenue, or any worldly goods, was considered as too strict and severe, and dispensed with soon after his death. In 1231, Gregory IX. published an interpretation of this rule, mitigating its rigour; which was farther confirmed by Innocent IV. in 1245, and by Alexander IV. in 1247. These milder alterations were zealously opposed by a branch of the Franciscans called the *spiritual*; and their complaints were regarded by Nicolas III. who, in 1279, published a famous constitution, confirming the

rule of St Francis, and containing an elaborate explanation of the maxims it recommended, and the duties it prescribed. In 1287, Matthew of Aqua Sparta, being elected general of the order, discouraged the ancient discipline of the Franciscans, and indulged his monks in abandoning even the appearance of poverty; and this conduct inflamed the indignation of the spiritual or austere Franciscans; so that from the year 1290, seditions and schisms arose in an order that had been so famous for its pretended disinterestedness and humility. Such was the enthusiastic frenzy of the Franciscans, that they impiously maintained, that the founder of their order was a second Christ, in all respects similar to the first; and that their institution and discipline were the true gospel of Jesus. Accordingly, Albizi, a Franciscan of Pisa, published a book in 1383, with the applause of his order, intitled, *The Book of the Conformities of St Francis with Jesus Christ*. In the beginning of this century, the whole Franciscan order was divided into two parties; the one, embracing the severe discipline and absolute poverty of St Francis, were called *spirituals*; and the other, who insisted on mitigating the austere injunctions of their founder, were denominated *brethren of the community*. These wore long, loose, and good habits, with large hoods; the former were clad in a strait, coarse, and short dress, pretending that this dress was enjoined by St Francis, and that no power on earth had a right to alter it. Neither the moderation of Clement V. nor the violence of John XXII. could appease the tumult occasioned by these two parties: however, their rage subsided from the year 1329. In 1368 these two parties were formed into two large bodies, comprehending the whole Franciscan order, which subsist to this day; viz. the *conventual brethren*, and the *brethren of the observance or observation*, from whom sprung the capuchins and recolects. The general opinion is, that the Franciscans came into England in the year 1224, and had their first house at Canterbury, and their second at London; but there is no certain account of their being here till king Henry VII. built two or three houses for them. At the dissolution of the monasteries, the conventual Franciscans had about 55 houses, which were under seven custodies or wardenships; viz. those of London, York, Cambridge, Bristol, Oxford, Newcastle, and Worcester.

FRANCONIA, a circle of the German empire, lying between Bohemia on the east, and the electorate of Mentz on the west. Its capital is Nuremberg; and from this country the Franks, who conquered and gave name to the kingdom of France, are said to have come.

FRANGULA, in botany. See RHAMNUS.

FRANK LANGUAGE, *Lingua Franca*, a kind of jargon spoken on the Mediterranean, and particularly throughout the coasts and ports of the Levant, composed of Italian, Spanish, French, vulgar Greek, and other languages.

FRANK, or *Franc*, an ancient coin, either of gold or silver, struck and current in France. The value of the gold franc was something more than that of the gold crown; the silver franc was a third of the gold one: this coin has been long out of use, tho' the term is still retained as the name of a money of account; in which sense it is equivalent to the livre, or 20 sols.

FRANK,

Frank.

FRANK, or *Franc*, meaning literally *free* from charges and impositions, or exempt from public taxes, has various significations in the ancient English customs.

FRANK Almoigne, (*libera elemosyna*), or "free alms;" a tenure of a spiritual nature, whereby a religious corporation, aggregate or sole, holdeth lands of the donor to them and their successors for ever. The service which they were bound to render for these lands was not certainly defined: but only in general to pray for the souls of the donor and his heirs, dead or alive; and therefore they did no fealty (which is incident to all other services but this), because this divine service was of a higher and more exalted nature. This is the tenure by which almost all the ancient monasteries and religious houses held their lands; and by which the parochial clergy, and very many ecclesiastical and eleemosynary foundations, hold them at this day; the nature of the service being upon the reformation altered, and made conformable to the purer doctrines of the church of England. It was an old Saxon tenure; and continued under the Norman revolution, through the great respect that was shown to religion and religious men in ancient times. This is also the reason that tenants in frankalmoign were discharged of all other services except the *trinoda necessitas*, of repairing the highways, building castles, and repelling invasions; just as the druids, among the ancient Britons, had *omnium rerum immunitatem*. And even at present, this is a tenure of a very different nature from all others; being not in the least feudal, but merely spiritual. For, if the service be neglected, the law gives no remedy by distress, or otherwise, to the lord of whom the lands are holden; but merely a complaint to the ordinary or visitor to correct it.

FRANK-Chace is defined to be a liberty of free chace, whereby persons that have lands within the compass of the same, are prohibited to cut down any wood, &c. out of the view of the forester.

FRANK-Fee, signifies the same thing as holding lands and tenements in fee-simple; that is, to any person and his heirs, and not by such service as is required by ancient demesne, but is pleaded at common law. See **FEE**.

FRANK-Law, a word applied to the free and common law of the land, or the benefit a person has by it.

He that for any offence loseth this frank-law, incurs these inconveniences, viz. He may not be permitted to serve on juries, nor used as an evidence to the truth; and if he has any thing to do in the king's court, he must not approach it in person, but appoint his attorney; his lands, goods, and chattels, shall be seized into the king's hands; and his lands be estraated, his trees rooted up, and his body committed to custody.

FRANK-Marriage, in law, is where tenements are given by one man to another, together with a wife, who is the daughter or cousin to the donor, to hold in frank-marriage. By such gift, though nothing but the word *frank-marriage* is expressed, the donees shall have the tenements to them, and the heirs of their two bodies begotten; that is, they are tenants in special tail. For this one word, *frankmarriage*, denotes, *ex vi termini*, not only an inheritance, like the word *frankalmoigne*, but likewise limits that inheritance; supply-

N^o 132.

ing, not only words of descent, but of procreation also. Such donees in frank-marriage are liable to no service but fealty; for a rent reserved therein is void until the fourth degree of consanguinity be past between the issues of the donor and donee.

FRANK-Pledge, in law, signifies a pledge or surety for the behaviour of freemen.

According to the ancient custom of England, for the preservation of the public peace, every free-born man, at the age of fourteen, except religious persons, clerks, knights, and their eldest sons, was obliged to give security for his truth and behaviour towards the king and his subjects, or else be imprisoned. Accordingly, a certain number of neighbours became interchangeably bound for each other, to see each person of their pledge forthcoming at all times, or to answer for the offence of any one gone away: so that whenever any person offended, it was presently inquired in what pledge he was, and there the persons bound either produced the offender in 31 days, or made satisfaction for his offence.

FRANK-Tenement. See **TENURE**.

FRANKED LETTERS. The privilege of letters coming free of postage to and from members of parliament was claimed by the house of commons in 1660, when the first legal settlement of the present post-office was made; but afterwards dropped, upon a private assurance from the crown, that this privilege should be allowed the members. And accordingly a warrant was constantly issued to the postmaster-general, directing the allowance thereof to the extent of two ounces in weight: till at length it was expressly confirmed by 4 Geo. III. c. 24. which adds many new regulations, rendered necessary by the great abuses crept into the practice of franking; whereby the annual amount of franked letters had increased from L. 23,600 in the year 1715, to L. 170,700 in the year 1763. Further regulations have since taken place; in particular, franks must be dated (the month written at length), and put into the office the same day; notwithstanding which, the revenue still loses by this privilege above L. 80,000 *per annum*.

FRANKEN (Franciscus), commonly called *Old Frank*, a famous Flemish painter, supposed to have been born about the year 1544; but tho' his works are well known, very few of the circumstances of his life have been transmitted to posterity. This master painted historical subjects from the Old and New Testaments; and was remarkable for introducing a great number of figures into his compositions, which he had the address to group very distinctly. Vandyck often commended his works, and thought them worthy of a place in any collection.

FRANKEN (Franciscus), distinguished by the name of *Young Frank*, was the son of the former, born in the year 1580. He was instructed by his father; whose style he adopted so closely, that their works are frequently mistaken. When he found himself sufficiently skilled at home, he travelled into Italy for improvement in colouring; and, on his return, his works were much coveted. The most capital performance of this painter are, a scriptural performance in the church of Notre-dame at Antwerp; and an excellent picture, in a small size, of Solomon's idolatry. Young Frank died in 1642.

FRANK-

Frank.

Frankendal
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Franklin.

FRANKENDAL, a strong town of Germany, in the dominions of the Elector Palatine. It was taken by the Spaniards in 1623, by the Swedes in 1632, and burnt by the French in 1688. E. Long. 8. 29. N. Lat. 49. 28.

FRANKENIA, in botany: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quinquefid, and funnel-shaped; the petals five; the stigma sexpartite; the capsule unilocular and trivalvular.

FRANKINCENSE. See INCENSE.

FRANKLIN (Thomas), D. D. chaplain in ordinary to his majesty, was the son of Richard Franklin, well known as the printer of an anti-ministerial paper called *The Craftsman*; in the conduct of which he received great assistance from Lord Bolingbroke, Mr Pulteney, and other excellent writers, who then opposed Sir Robert Walpole's measures. By the advice of the second of these gentlemen, young Franklin was devoted to the church, with a promise of being provided for by the patriot; who afterwards forgot his undertaking, and then entirely neglected him. He was educated at Westminster-school; from whence he went to the university of Cambridge, where he became fellow of Trinity college, and was some time Greek professor. In Dec. 1758, he was instituted vicar of Ware and Thundridge; which, with the lectureship of St Paul, Covent-Garden, and a chapel in Queen-street, were all the preferments he held till he obtained the rectory of Braford in Kent. This gentleman was possessed of no inconsiderable share of learning and poetical abilities, and was long a favourite in the literary world. His translations of Phalaris, Sophocles, and Lucian, equally evince his learning and his genius, as they are not more distinguished for fidelity in the version, than congeniality with the spirit of the admirable originals. Dr Franklin, like Mr Foote, suffered a translation from the French to be printed in his name; but the Orestes and Electra are supposed to be all that were really by him. It was a translation of Voltaire's works, to which also Dr Smollet's name appears. His own dramatic compositions, of which the principal are the tragedies of *The Earl of Warwick* and *Matilda*, are universally known, and deservedly esteemed by the public; so that his death, which happened March 15. 1784, may be considered as a loss to the republic of letters.

FRANKLIN (Dr Benjamin), one of the most celebrated philosophers and politicians of the present age, was born at Boston in North America in the year 1706. His father was a tallow-chandler; whose house he quitted before the age of 14, in order to go to Philadelphia, where he was introduced to the only printer established in that city. This person, being struck with his appearance and manner, took him into his house, and instructed him in his art; and Franklin, by his disposition, genius, and diligence, soon deserved and increased the favourable opinion that had been entertained of him by his master. Nor was he less agreeable to those who visited the printing-house out of curiosity: for the typographical art being then almost unknown in those parts, great numbers were attracted by the mystery; and were so well pleased with the skill, activity, and communicative manner

of our young operator, that they seldom went away without leaving him some marks of their liberality.— Here he soon began to manifest that love of learning and thirst after knowledge for which he was so remarkable: and as it was difficult to procure books from England, young Franklin entered into a society with some others of his own age; among whom it was agreed, that they should bring such books as they had into one place, in order to form a common library. This resource, however, was found so defective, that the society, at Franklin's persuasion, resolved to contribute a small sum monthly towards the purchase of books for their use from London. Thus their stock began to increase rapidly; and the inhabitants of Philadelphia, being desirous of having a share in their literary knowledge, proposed that the books should be lent out on paying a small sum for the indulgence. Thus in a few years the society became rich, and possessed more books than were perhaps to be found in all the other colonies; the collection was advanced into a public library; and the other colonies, sensible of the advantages resulting from thence, began to form similar plans; whence originated the libraries at Boston, New York, Charlestown, &c. that of Philadelphia being now inferior to none in Europe.

Mr Franklin, notwithstanding all the advantages he could derive from his situation in Philadelphia, was not yet satisfied. He came over to England therefore in the year 1724 or 1725; and worked as a journeyman printer with one Mr Watts. By him he was greatly esteemed; and treated with such kindness, that it was always remembered with gratitude by our philosopher. Mr Watts often predicted that his young American compositor would one day make a considerable figure in the world; and he lived to see his prediction fulfilled with regard to his philosophical discoveries, though not as to the part he acted in political matters.

Having staid some time in London, Mr Franklin returned to Philadelphia, where he persuaded the printer with whom he formerly resided to set up a newspaper; which was attended with such benefit, that his master admitted him as a partner in the business, and gave him his daughter in marriage. Having thus established himself as a printer, and acquired some fortune, Mr Franklin was left at liberty to follow the natural bent of his genius. Being much addicted to the study of natural philosophy, and the discovery of the Leyden experiment in electricity having rendered that science an object of general curiosity, Mr Franklin applied himself to it, and soon began to distinguish himself eminently in that way. He is particularly remarkable for being the first who thought of securing buildings from lightning; and he is generally thought to have been the inventor of the electrical kite, though some ascribe this invention to another. His theory of positive and negative electricity has also received the sanction of public approbation; though, when rigorously investigated, it does not seem capable of supporting itself*. His theories were at first opposed by

* See *Electricity*, Sect. v. and vi.

Franklin. the Society, and had the degree of doctor of laws conferred upon him by one of the universities: but at this time, by reason of the war which broke out between Britain and France, he returned to America, and began to take a share in the public affairs of that country.

Having planned the different posts through the continent of America, he was made postmaster-general for that country; but as in the subsequent disputes he took always the popular side, he was afterwards removed from that employment. In the year 1767, he was examined before the house of commons concerning the stamp-act. In 1773, having been appointed agent for the province of Pennsylvania, he came over to England at the time when the disputes between Great Britain and America were on the point of coming to extremities; when he attracted the public attention by a letter on the duel betwixt Mr Whatley and Mr Temple concerning the publication of governor Hutchinson's letters. On the 29th January next year, he was examined before the privy-council on a petition he had presented long before as agent for Massachusetts Bay against Mr Hutchinson: but this petition being disagreeable to ministry, was precipitately rejected, and Dr Franklin was soon after removed from his office of postmaster-general for America. He was now looked upon by government with such a jealous eye, that some thoughts were entertained of having him arrested as a fomentor of rebellion. The Doctor, however, being on his guard, departed for America in the beginning of the year 1775 with such privacy, that he had left England before it was suspected that he entertained any design of quitting it. Being named one of the delegates to the continental congress, he had a principal share in bringing about the revolution and declaration of independency on the part of the colonies. In 1776 he was deputed by congress to Canada, to negotiate with the people in that country, and to persuade them to throw off the British yoke; but the Canadians had been so much disgusted with the hot-headed zeal of the New Englanders, who had burnt some of their chapels, that they refused to listen to the proposals, though enforced by all the arguments Dr Franklin could make use of. On his return to Philadelphia, congress, sensible how much he was esteemed in France, sent him thither to put a finishing hand to the private negotiations of Mr Silas Deane; and this important commission was readily accepted by the Doctor, though then in the 71st year of his age. The event is well known; a treaty of alliance and commerce was signed between France and America; and M. le Roi asserts, that the Doctor had a great share in the transaction, by strongly advising M. Maurepas not to lose a single moment, if he wished to secure the friendship of America, and to detach it from the mother-country. He likewise informs us, that no man could be more rejoiced than Dr Franklin was on the day that the British ambassador, Lord Stormont, quitted Paris on account of the rupture betwixt the two nations. In 1777 he was regularly appointed plenipotentiary from Congress to the French court; but obtained leave of dismissal in 1780. Having at last seen the full accomplishment of his wishes by the conclusion of the peace in 1783, which gave independency to America, he became desirous of revisiting his native country. He therefore requested to be recalled;

and, after repeated solicitations, Mr Jefferson was appointed in his room. On the arrival of his successor, he repaired to Havre de Grace, and crossing the Channel, landed at Newport in the Isle of Wight; and, after a favourable passage, arrived safe at Philadelphia in the month of September 1785. He was received amidst the acclamations of a vast multitude who flocked from all parts to see him, and who conducted him in triumph to his own house. In a few days he was visited by the members of the congress and the principal inhabitants of Philadelphia. He was afterwards twice chosen president of the assembly of Philadelphia; but his increasing infirmities obliged him to ask permission to retire, and to spend the remainder of his life in tranquillity; which was granted.

During the greatest part of his lifetime the Doctor had been very healthy. In the year 1735, indeed, he was attacked by a pleurisy, which ended in a suppuration of the left lobe of the lungs, so that he was almost suffocated by the quantity of matter thrown up. But from this, as well as from another attack of the same kind afterwards, he recovered so completely, that his breathing was not affected afterwards in the least. As he advanced in years, however, he became subject to fits of the gout, to which in the year 1782 a nephritic colic was superadded. From this time he became subject to the stone as well as the gout, and for the last twelve months of his life these complaints almost entirely confined him to his bed. Notwithstanding his distressed situation, however, neither his mental abilities nor his natural cheerfulness ever forsook him. His memory was very tenacious to the very last; and he seemed to be an exception to the general rule, that at a certain period of life the organs which are subservient to memory become callous; a remarkable instance of which is, that he learned to speak French after he had attained the age of 70. About 16 days before his death, he was seized with a feverish disorder; which, about the third or fourth day, was attended with a pain in the left breast. This became at last very acute, and was accompanied with a cough and laborious breathing. Thus he continued for five days, when the painful symptoms ceased at once, and his family began to flatter themselves with hopes of his recovery. But a new imposthume had now taken place in the lungs; which suddenly breaking as the others had done, he was unable to expectorate the matter fully. Hence an oppression of the organs of respiration and a lethargic disposition came on; which gradually increasing, he expired on the 17th of April 1790, about 11 at night.—He left one son, governor William Franklin, a zealous loyalist, who now resides at London; and a daughter, married to Mr William Bache merchant in Philadelphia. This lady was his greatest favourite, and waited upon him during his last illness. Three days before he died, he begged that his bed might be made, that he might die in a decent manner; to which Mrs Bache answered, that she hoped he would recover and live many years longer: but he replied, "I hope not."

With regard to the character of Dr Franklin, he was said to be sententious, but not fluent in society; rather inclined to listen than to talk; an informing rather than a pleasing companion; very impatient, however, of interruption; so that he would frequently mention the custom

Franks
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Fraser-
burgh.

Fraternal,
Fraternity.

of the Indians, who keep silence for some time before they answer a question which they have heard with attention. With regard to religion, he was a firm believer in the Scriptures; and his sentiments on death may be gathered from a letter written about 35 years ago to Miss Hubbard on the death of her father-in-law Mr John Franklin. "We are spirits (says he): That bodies should be lent us while they can afford us pleasure, assist us in acquiring knowledge, or doing good to our fellow creatures, is a kind and benevolent act of God. When they become unfit for these purposes, and afford us pain instead of pleasure; instead of an aid they become an incumbrance; and answer none of the intentions for which they were given: it is then equally kind and benevolent, that a way is provided by which we may get rid of them. Death is that way.—Our friend and we are invited abroad on a party of pleasure that is to last for ever. His carriage was first ready, and he is gone before us; we could not all conveniently start together; and why should you and I be grieved at this, since we are soon to follow, and know where to find him?" The Doctor was author of many tracts on electricity, and other branches of natural philosophy, as well as on politics and miscellaneous subjects.

FRANKS, FRANCES, FRANKIS, or FRANQUIS, a name which the Turks, Arabs, Greeks, &c. give to all the people of the western parts of Europe. The appellation is commonly supposed to have had its rise in Asia, at the time of the croisades; when the French made the most considerable figure among the croissés: from which time the Turks, Saracens, Greeks, Abyssinians, &c. used it as a common term for all the Christians of Europe; and called Europe itself *Frankistan*. The Arabs and Mahometans, says M. d'Herbelot, apply the term *Franks* not only to the French (to whom the name originally belonged), but also to the Latins and Europeans in general.

But F. Goar, in his notes on Condinus, cap. 5. n. 43. furnishes another origin of the appellation *Franks*, of greater antiquity than the former. He observes, that the Greeks at first confined the name to the *Franci*, i. e. the German nations, who had settled themselves in France or Gaul; but afterwards they gave the same name to the Apulians and Calabrians, after they had been conquered by the Normans; and at length the name was farther extended to all the Latins.

In this sense is the word used by several Greek writers; as Comnenus, &c. who, to distinguish the French, call them the *western Franks*. Du Cange adds, that about the time of Charlemagne, they distinguished eastern France, western France, Latin or Roman France, and German France, which was the ancient France, afterwards called *Franconia*.

FRASCATI, or FRESCATI. See FRESCATI.

FRASERSBURGH, a small sea-port town in the county of Aberdeen, situated in a cheap and populous country, on the point of land called *Kinnaird's Head*, which is the southern extremity of the Murray firth. It has a small good harbour, made and kept up at a considerable expence by the proprietor and the town, and well adapted for building of small vessels. According to the tide, there are 11 to 15 feet water within the harbour, and 20 feet immediately without at spring-tides: without is a tolerable road for shipping, in a bay nearly a league in length and half a

league in depth, with good anchorage in a sandy bottom. Vessels of about 200 tons burden enter the harbour at present. Fraserburgh contains about 1000 inhabitants, and is well situated for trade with the east coast of Europe. The town has lately advanced considerably, and requires only encouragement to render it a port of some consequence on the coast of Scotland. At present it carries on a small trade to the east sea, several manufactories are forming in its neighbourhood, and the port is well adapted for building of small vessels.

FRATERNAL, something belonging to the relation of brother.

FRATERNAL Affection is the love and attachment subsisting among, or due to one another by, children of the same family.

Though all mankind sprung from the same head, and are bound to cultivate a mutual good-will to each other; yet this duty is not so obvious and striking as that which is incumbent on those who belong to the same family. Nothing can approach nearer to self-love than fraternal affection: and there is but a short remove from our own concerns and happiness, to theirs who come from the same stock, and are partakers of the same blood. Nothing, therefore, can be more horrible than discord and animosity among members so allied; and nothing so beautiful as harmony and love.

This relation is formed by nature, not by choice; and though it has many things in common with, yet it is prior to, the obligations of friendship: consequently nature and reason dictate that there should be a peculiar affection between brethren. We are not obliged, however, to make a brother or sister an intimate or bosom friend in preference to one who is not akin. Diversity of temper, and want of suitable qualifications, may render it unsafe and improper. But where friendship and fraternity meet in the same persons, such a conjunction adds a lustre to the relation.

Among brethren, an hearty benevolence, an ardent concern for each other's welfare, a readiness to serve and promote it, are the peculiar offices of this relation; and though friends are to have their share, yet the claim of kindred is first and ordinarily strongest. "Necessaria præsidia vitæ debentur iis maxime (says Cicero), quos ante dixi (i. e. propinquis); vita autem, victusque communis, concilia, sermones, &c. in amicitia videntur maxime." *De Officiis*.

FRATERNITY, BROTHERHOOD, the relation or union of brothers, friends, partners, associates, &c.

FRATERNITY, in a civil sense, is used for a guild, association, or society of persons, united into a body, for some common interest or advantage. See COMPANY and GUILD.

FRATERNITY, in the Roman Catholic countries, signifies a society for the improvement of devotion. Of these there are several sorts; as, 1. The fraternity of the rosary, founded by St Dominic. It is divided into two branches, called the *common rosary*, and the *perpetual rosary*; the former of whom are obliged to confess and communicate every first Sunday in the month, and the latter to repeat the rosary continually. 2. The fraternity of the scapulary, whom the blessed Virgin, according to the sabbatine bull of pope John XXII. has promised to deliver out of hell the first Sunday after their death. 3. The fraternity of St Francis's girdle

Fratres
||
Fratricelli.

dle are clothed with a sack of a grey colour, which they tie with a cord; and in processions walk bare-footed, carrying in their hands a wooden cross. 4. That of St Austin's leathern girdle, comprehends a great many devotees. Italy, Spain, and Portugal, are the countries where one sees the greatest number of these fraternities, some of which assume the name of *arch-fraternities*. Pope Clement VII. instituted the arch-fraternity of charity, which distributes bread every Sunday among the poor, and gives portions to 40 poor girls on the feast of St Jerom their patron. The fraternity of death, buries such dead as are abandoned by their relations, and causes masses to be celebrated for them.

FRATRES ARVALES. See ARVALES.

FRATRIAGE, the partition among brothers, or coheirs, coming to the same inheritance or succession.

FRATRICELLI, in ecclesiastical history, an enthusiastic sect of Franciscans, which rose in Italy, and particularly in the marquise of Ancona, about the year 1294. The word is an Italian diminutive, signifying *fratricula*, or "little brothers;" and was here used as a term of derision, as they were most of them apostate monks, whom the Italians call *fratelli*, or *fratricelli*. For this reason the term *fratricelli*, as a nickname, was given to many other sects, as the Catharists, the Waldenses, &c. however different in their opinions and in their conduct. But this denomination applied to the austere part of the Franciscans was considered as honourable. See FRANCISCANS.

The founders were P. Maurato, and P. de Fossombroni, who having obtained of pope Celestin V. a permission to live in solitude, after the manner of hermits, and to observe the rule of St Francis in all its rigour, several idle vagabond monks joined them, who, living after their own fancies, and making all perfection to consist in poverty, were soon condemned by pope Boniface VIII. and his successor, and the inquisitors ordered to proceed against them as heretics: which commission they executed with their usual barbarity. Upon this, retiring into Sicily, Peter John Oliva de Serignan had no sooner published his Comment on the Apocalypse, than they adopted his errors. They held the Romish church to be Babylon, and proposed to establish another far more perfect one: they maintained, that the rule of St Francis was the evangelical rule observed by Jesus Christ and his apostles. They foretold the reformation of the church, and the restoration of the true gospel of Christ, by the genuine followers of St Francis, and declared their assent to almost all the doctrines which were published under the name of the abbot Joachim, in the "Introduction to the everlasting Gospel," a book published in 1250, and explained by one of the spiritual friars whose name was Gerhard. Among other enormities inculcated in this book, it is pretended that St Francis was the angel mentioned in Rev. xiv. 6. and had promulgated to the world the true and everlasting gospel of God; that the gospel of Christ was to be abrogated in 1260, and to give place to this new and everlasting gospel, which was to be substituted in its room; and that the ministers of this great reformation were to be humble and bare-footed friars, destitute of all worldly employments. Some say they even elected a pope of their church; at least they appointed a general, with supe-

riors, and built monasteries, &c. Beside the opinions of Oliva, they held, that the sacraments of the church were invalid; because those who administered them, had no longer any power or jurisdiction. They were condemned afresh by pope John XXII. in consequence of whose cruelty they regarded him as the true anti-christ; but several of them returning into Germany, were sheltered by Lewis, duke of Bavaria, the emperor.

There are authentic records, from which it appears, that no less than 2000 persons were burnt by the inquisition, from the year 1318 to the time of Innocent VI. for their inflexible attachment to the poverty of St Francis. The severities against them were again revived towards the close of the 15th century by pope Nicolas V. and his successors. However, all the persecutions which this sect endured were not sufficient to extinguish it; for it subsisted until the times of the reformation in Germany, when its remaining votaries adopted the cause and embraced the doctrine and discipline of Luther. And this has led Popish writers to charge the Fratricelli with many enormities, some of which are recounted by M. Bayle, art. *Fratricelli*.

The Fratricelli had divers other denominations: they were called *fratricelli*, according to some, because they lived in community, in imitation of the primitive Christians, or rather through the humility of the founder of the Franciscan order, to which the Fratricelli originally belonged; *dulcini*, from one of their doctors; *Bizochi*, *Beguins*, and *Beghardi*.

FRATRICIDE, the crime of murdering one's brother. See Parricide.

FRAUD, in law, signifies deceit in grants, or conveyances of lands, &c. or in bargains and sales of goods, &c. to the damage of another person.

A fraudulent conveyance of lands or goods to deceive creditors, as to creditors is void in law. And a fraudulent conveyance in order to defraud purchasers, is also to such purchasers void; and the persons justifying or putting off such grants as good, shall forfeit a year's value of the lands, and the full value of the goods and chattels, and likewise shall be imprisoned. See CHEATING.

FRAUSTADT, a town of Silesia, on the frontiers of Poland, remarkable for a battle gained by the Swedes over the Saxons in 1706. E. Long. 15. 50. N. Lat. 51. 45.

FRAXINELLA, in botany. See Dictamnus. —It is remarkable of this odorous plant, that, when in full blossom, the air which surrounds it in a still night, may be inflamed by the approach of a lighted candle. Dr Watson doubts whether this inflammability proceeds from an inflammable air which is exhaled by the plant, or from some of the finer parts of the essential oil of the plant being dissolved in the common atmospherical air. The latter is the most probable supposition; for were it the pure inflammable air, as Mr Cavallo observes, it would, on account of its small specific gravity, leave the plant as soon as it was produced. Common air acquires the property of becoming inflammable, by being transmitted through several essential oils.

FRAXINUS, the Ash: A genus of the diœcia order, belonging to the polygamia class of plants; and in the natural method ranking under the 44th order,

Sepiaria.

Fratricide
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Fraxinus.

Fræy
Freats.

Sepiaria. There is no hermaphrodite calyx, or it is quadripartite; and there is either no corolla, or it is tetrapetalous: there are two stamina; one pistil; one lanceolated seed; and the pistil of the female is lanceolated. There are six species; of which the most useful is the common ash, which is so well known, that it needs no description. If a wood of these trees is rightly managed, it will turn greatly to the advantage of the owner: for, by the underwood, which will be fit to cut every eight or ten years, there will be a continual income, more than sufficient to pay the rent of the ground and all other charges; and still there will be a stock preserved for timber, which in a few years will be worth 40s. or 50s. per tree. This tree flourishes best in groves, but grows very well in rich soil in open fields. It bears transplanting and lopping. In the north of Lancashire they lop the tops of these trees to feed the cattle in autumn when the grafs is on the decline; the cattle peeling off the bark as food. The wood hath the singular property of being nearly as good when young as when old. It is hard and tough, and is much used to make the tools employed in husbandry. The ashes of the wood afford very good potash. The bark is used in tanning calfskin. A slight infusion of it appears of a pale yellowish colour when viewed betwixt the eye and the light; but when looked down upon, or placed betwixt the eye and an opaque object, appears blue. This blueness is destroyed by the addition of an acid, but recovered by alkalies. The seeds are acrid and bitter. In the church-yard of Lochaber in Scotland, Dr Walker measured the trunk of a dead ash tree, which at five feet from the surface of the ground was 58 feet in circumference.—Horses, cows, sheep, and goats eat it; but it spoils the milk of cows, so that it should not be planted in dairy farms.

FRAY literally signifies to fret; as cloth or stuff does by rubbing, or over-much wearing.

Among hunters a deer is said to fray his head, when he rubs it against a tree, to cause the skins of his new horns to come off.

FREA, or FRIGGA, the wife of Odin, was, next to him, the most revered divinity among the Heathen Saxons, Danes, and other northern nations. As Odin was believed to be the father, Frea was esteemed the mother of all the other gods. In the most ancient times, Frea was the same with the goddesses Herthus, or Earth, who was so devoutly worshipped by the Angli and other German nations. But when Odin, the conqueror of the north, usurped the honours due only to the true Odin, his wife Frea usurped those which had been formerly paid to mother Earth. She was worshipped as the goddesses of love and pleasure, who bestowed on her votaries a variety of delights, particularly happy marriages and easy child-births. To Frea the sixth day of the week was consecrated, which still bears her name.

FREAM, a name given by farmers to ploughed lands worn out of heart, and laid fallow till it recover.

FREATS, or FREITS, a term used in Scotland for ill omens, and sometimes denoting accidents supernaturally unlucky. King James VI. in his *Demonologie*, MS. pen. Edit. B. I. ch. III. p. 13. "But I pray you forget not likewise to tell what are the Devil's rudimentis? E. His rudimentis I call first in generall

all that quhilk is called vulgairlie the vertu of woode, herbe, and staine; quhilk is used by unlawfull charmis without natural causis. As lykeways all kynd of prattiques, freitis, or uther lyk extraordinair actions, quhilk cannot abyde the trew twiche of naturall reason." It occurs again in the same sense in p. 14. marg. note; and in p. 41. speaking of *Sorcerers*: "And in generall that naime was gevin thaim for using of sic chairmis and freitis, as that craft teachis thaim."

FRECKLES, LENTIGINES, spots of a yellowish colour, of the bigness of a lentile-seed, scattered over the face, neck, and hands. Freckles are either natural, or proceeding accidentally from the jaundice or the action of the sun upon the part. Heat, or a sudden change of the weather, will often cause the skin to appear of a darker colour than natural; and thereby produce what is called *tan*, *sunburn*, and *morpheaw*, which seem to differ only in degree; and usually disappear in winter.

Persons of a fine complexion, and such whose hair is red, are the most subject to freckles, especially in those parts which they expose to the air.

To remove freckles, put juice of lemons in a glass-vial, and mixing it with sugar and borax finely powdered, let it digest eight days, and then use it. Homberg proposes bullock's gall mixed with alum, and, after the alum has precipitated, exposed three or four months to the sun in a close vial, as one of the best remedies known for the removing of freckles.

FREDBERG, a rich, strong, and fine town of Germany, in Misnia, remarkable for its mines, and for being the burying place of the princes of the house of Saxony. It is a delightful place, seated on the river Multa. E. Long. 13. 40. N. Lat. 51. 2.

FREDERICA, a town of North America, in Georgia, seated at the mouth of the river Alatomaha, lately built and fortified by general Oglethorpe. The island it stands upon is called *St Simons's*; and is about 13 miles in length, and 4 in breadth. W. Long. 81. 35. N. Lat. 31. 0.

FREDERICK II. the Great, of Prussia, one of the greatest warriors the present age has produced, was the son of Frederick-William then hereditary prince of Brandenburg, and Maria Dorothea a princess of the house of Brunswick. He was born in 1712, the year before his father Frederick I. mounted the throne of Prussia. The latter was so far from being a patron of literature, that he regarded nothing but what related to the military art; and most of his generals, whatever their merits in their own line might be, scarce knew how to sign their names. So great indeed was the ignorance of the monarch himself, that he banished from his dominions a philosopher of the name of *Wolf*, merely because he maintained the doctrine of pre-established harmony; upon which a theologian named *Lange* asserted, that on such principles his majesty's grenadiers were not culpable when they deserted, it being only the necessary consequence of the impulse their machine had received from their Creator. His son was of a disposition the very reverse of his father. Being put from his birth under the care of Val de Recoule a French lady of great merit and understanding, he acquired, in his early years, not only a taste for literature in general, but a predilection for the French language, which was not obliterated throughout his whole life.

Freckles
Frederick.

Frederick. It is not to be supposed that a prince of the disposition above mentioned, would suffer his son to be long engaged in literary pursuits. At seven years of age, young Frederick was taken out of the hands of Madame de Recoules, and put under the care of military tutors. General Count de Finckstein, an old warrior, was appointed his governor; his sub-governor was Colonel de Kalkstein, an officer renowned for his courage and experience; he was taught mathematics and fortification by Major Senning; Han de Jendun, a Frenchman, instructed him in other branches of knowledge; and a cadet of the name of *Kenzel*, taught him his exercise. At eight years of age he was furnished with a small arsenal stored with all sorts of arms proportioned to his age and strength, of which his father left him absolute master. In a short time he was named captain and chief of the corps of cadets; and the young prince performed every day, in miniature, with his little soldiers, all the evolutions with which his father exercised his giants. At last he received the command of a company in his father's regiment famous throughout all Europe, and which was composed of men of whom scarce one was short of seven French feet.

Born, however, with a taste for the arts, he devoted to their cultivation every moment he could escape the vigilance of his guardians. He was more particularly fond of poetry and music, and when he could find a moment's leisure, he read French authors, or played on the flute; but his father, as often as he surprised him playing or reading, broke his flute and threw his books into the fire. The prince, chagrined at such injurious treatment, and having a great desire to visit Germany, England, France, and Italy, desired permission to travel. This, however, his father would not allow, but permitted him to accompany himself in the little journeys he made from time to time into Germany; and, in 1728, took him to Dresden to see the king of Poland. By these little expeditions the desire of the prince to visit other countries was only the more inflamed, so that at last he formed a design of setting out without his father's knowledge. The design was intrusted to two of the prince's young friends named *Kat* and *Keit*; money was borrowed for the occasion, and the day of their departure fixed, when unluckily the whole project was discovered. The old king, implacable in his resentment, and considering his son as a deserter, determined to put him to death. He was shut up in the fortress of Cultrin; and it was with the utmost difficulty that the count de Seckendorf, sent for the purpose by the emperor Charles VI. was able to alter the king's resolution. Certain vengeance, however, was determined on both the intended associates in Frederick's journey. *Keit* escaped the danger by flying into Holland; but *Kat* had not that good fortune. The king first directed that he should be tried by a court-martial; but as they, contrary to his expectation, only sentenced the criminal to perpetual imprisonment, the revengeful monarch by an unheard of exercise of the royal prerogative caused him to be beheaded. The execution was performed under the windows of the prince royal, whose head was held towards the scaffold by four grenadiers; but no sooner did he approach the window and see his friend in the hands of the executioner, than he stretched out his arms towards him, crying out "*Kat!*"

Frederick. and instantly fainted away. During the remainder of his life he considered capital punishments with a great degree of horror, and they were rare throughout the Prussian dominions while he continued to reign. When the emperor had succeeded in preventing the execution of Frederick, the king remarked, that "Austria would one day see what a serpent she had nourished in her bosom." The royal prisoner remained a year at Cultrin; during which time his father wished that he should learn the maxims of government and finance. For this purpose M. de Munchow, president of the chamber of domains and finances, was ordered to make him assist at all their assemblies, to consider him as a simple counsellor, to treat him as such, and make him work like others. The young counsellor, however, though he assisted at their meetings, did not trouble himself with reading acts or copying decrees. Instead of this, he amused himself sometimes with reading French pamphlets, and at others with drawing caricatures of the president or members of the assembly. M. Munchow himself was likewise very favourable to the prince at this time, by furnishing him books and other articles of amusement, notwithstanding the express prohibition of his father: though in this he certainly ran a great risk; for the old king, who set but a very light value on human life, would undoubtedly have put him to death had he received intelligence of his complaisance.

Frederick, after passing the time above mentioned in confinement, was recalled to Berlin, on pretence of being present at the celebration of his eldest sister's marriage with the hereditary prince of Bareith; but the true reason was, that the king had now prepared a match for the prince himself. This was the princess Elizabeth Christina of Brunswick, niece to the emperors. Frederick, who was not only totally indifferent to the fair sex in general, but particularly prejudiced against this princess, made some objections; his father, however, overcame all obstacles with "his usual arguments (says the author of the life of Frederick), viz. his cane, and a few kicks."

The coldness which Frederick at this time showed for the fair sex, appears not to have been natural; for as early as the year 1723, though then only in the 11th year of his age, he is said to have fallen in love with the princess Anne, daughter of George II. Even at this early period he entered into vows to refuse every other but her for his consort; nor were these ever broken, as far as depended on himself. The marriage perhaps would have taken place, had it not been for some differences which arose between the courts of Prussia and Hanover about a few acres of meadow-land, and two or three Hanoverians enlisted by the Prussian recruiters. It is supposed also, that it was intended at one time to marry him to Maria Theresa of Austria; but, as in that case it would have been necessary to change his religion, Frederick derived from thence a plausible pretence for refusing the match. The princess whom he espoused had a large share of beauty; and, what was still better, an excellent heart: but Frederick is said to have suffered so much in his former amours, that certain natural and unsurmountable impediments remained to the completing of his marriage with any woman. Scarcely therefore was he in bed with his young spouse, when a cry of *Fire!* was raised by his friends.

Frederick. friends. Frederick got up to see where the conflagration was; but finding it to be a false alarm, he sent messengers to compose the princess; but neither that night, nor any other, did he think proper to disturb her rest.

On occasion of this marriage, Frederick received from his father the county of Rupin. He resided in the capital of this county, named also *Rupin*, for some time; but afterwards chose Rheinberg for his place of abode. This is a little town built in the sands, on the confines of Mecklenburg, and at that time containing only 1000 inhabitants; but it was soon greatly improved by Frederick. Having put over the great gate of the castle, however, the following inscription, *FREDERICO TRANQUILLITATEM COLENTI*, his father was displeased with it, and therefore hurried him from his peaceful retreat into the noise and tumult of war. At this time the succession to the crown of Poland had kindled a general war throughout Europe, and the king of Prussia was to send 10,000 auxiliaries to the imperial army, then commanded by prince Eugene. The king conducted his troops in person, and resolved to take this opportunity of giving his son an idea of war. At this time, however, he learnt but little; and only saw, as he himself expresses it, the shadow of the great Eugene. That consummate general, nevertheless, did not overlook his merit; but predicted that he would one day be a great captain. Frederick having gone to reconnoitre the lines at Philipsburg, in his return through a very open wood, was exposed to the cannon of the lines, which thundered incessantly. The balls broke a number of branches on every side of him: notwithstanding which, he never caused his horse move quicker; nor did his hand which held the bridle ever alter its motion even for a moment. He continued to converse quietly with the generals who attended him, and never showed the smallest sign of apprehension. Being one night at supper with field-marshal Grumkow, the conversation turned on the young prince Eugene who died on the Rhine; and he was asked whether that prince would ever have become a great man? Frederick decided in the negative, on account of young Eugene's not having known at any period of his life how to choose a friend who dared to tell him the truth.

During this campaign the health of the old king was so much impaired, that he was obliged to leave the army; and Frederick, on his return, was for some time intrusted with signing all the orders in his father's name. On the king's recovery the prince was sent to Stetten, under the care of the prince of Dessau, that he might see the fortifications of that town. He was afterwards permitted to go to Konigsberg to see the unfortunate Stanislaus, who had taken refuge in that place, and who was no less remarkable for his philosophy and constancy than for his misfortunes. With him Frederick remained for some weeks, and contracted a friendship which was not dissolved but by the death of Stanislaus. At last he was allowed to return to his peaceful mansion at Rheinberg, where he remained till the death of his father. In this place his time was occupied alternately by the study of the sciences, the cultivation of the arts, and the pleasures of friendship. Philosophy, history, politics, the military art, poetry and music, agreeably suc-

ceeded each other, and had each its stated period. The Frederick, prince passed the greatest part of the day in his library; and the remainder in the society of a select company of agreeable and learned men. The principal of these were Chafot, a French officer; Kayserling, a gentleman of Courland, on whom the prince bestowed the name of *Cesarion*; Jordan, a French refugee; and Knobelsdorf, director of the buildings and gardens; but who could converse on all the arts of designing with as much taste as judgement.—In these meetings, gaiety generally presided; there were generals to speak of war, musicians to form concerts, and excellent painters to decorate the apartments. Whilst Knobelsdorf was executing landscapes and laying out the gardens, Pefne was immortalizing himself by his ceilings, and du Buissou by his pictures of flowers. The two Grauns composed excellent music, or directed the orchestra; and Benda, one of the first violins of Europe, accompanied the prince who played extremely well on the flute. The morning was usually dedicated to study; gaiety and agreeable conversation prevailed at every repast; and every evening there was a little concert.—In this retreat Frederick conceived that ardent passion for military glory and the aggrandisement of his kingdom for which he became at last so remarkable; and here he is supposed to have formed the most sublime and daring projects. He was fired with a desire of imitating the celebrated heroes of antiquity, of whom he read in the ancient authors, and for which he set apart some hours every day. Amongst the works which he read almost every year, were Herodotus, Thucydides, Xenophon, Plutarch, Tacitus, Sallust, Livy, Quintus Curtius, Cornelius Nepos, Valerius Maximus, Polybius, Cæsar, Vegetius, &c. He never spoke but with enthusiasm of the great warriors of Greece and Rome; and when seated on the throne, thought he could never distinguish an able soldier in a more honourable manner than by conferring on him a Roman surname. Hence he distinguished, by the name of *Quintus Icilius*, M. Guichard who had written some treatises on the military art of the ancients; giving him at the same time a free battalion. This name of *Quintus Icilius* was retained by M. Guichard as long as he lived.

In his pursuit of glory Frederick found that it was not improper to cultivate the friendship of celebrated poets, philosophers, and others of the literary class; for which purpose he flattered, commended, and complimented all the most celebrated literati of Europe at that time. “The philosophers (says the author of his life) answered him as a mad lover writes to his mistress. They wrote to him that he was a great poet, a great philosopher, the *Solomon* of the north. All these hyperboles were printed; and Solomon was not sorry for it, though he had too much understanding to believe in them. Wolf, Rollin, Gravesande, Maupertuis, Algarotti, Voltaire, were honoured with his correspondence. The last especially, accustomed to offer up incense to the idol of the day were it transported from the dunghill to the altar, did not fail to exalt as the first man of the universe; a prince who was in expectancy of the throne, and who assured him that he was the greatest philosopher of the age and the first poet in the world.”

That Frederick might keep up his character with the literati, or perhaps from a real predilection for his principles,

Frederick. principles, he patronised the Apology of Wolf, and had his principal treatises translated into French. He even prevailed upon his father to relax a little in favour of that philosopher. A commission of reformed and Lutheran theologians was appointed in 1736, to examine into the tenets of that unfortunate philosopher. Wolf was declared innocent, and a letter was sent to him at Marpourg containing an invitation to return; but the philosopher did not think proper to make his appearance till the year 1740, when his protector was seated on the throne.

During his residence at Rheinsberg, Frederick composed his refutation of the principles of Machiavel, under the title of *Anti-Machiavel*; of which he sent the manuscript to Voltaire to correct, and to get printed.

The old king, now almost worn out with infirmity, saw with regret the predilection his son entertained for men of letters; and, in his peevish fits, often threatened the whole society with confinement in the fortrefs of Spandau. These threats frequently occasioned a violent alarm among the joyous company at Rheinsberg, which it required all the eloquence of Frederick to quiet. Their apprehensions on this account, however, were soon removed. At the commencement of the year 1740, the king's disorder increased to a great degree, and in the month of May his case became desperate. He lived, however, till the 31st of that month, when he expired, and left the throne to his son, Frederick II.

The acquisition of a kingdom did not abate Frederick's passion for literature, though to this he was now obliged to superadd the qualities and labours of a great king. A consideration of his transactions in this character falls under the article PRUSSIA, to which we refer: these, indeed, so totally engrossed the remaining part of his life, that little more remains to be said under this article, than to relate some anecdotes by which we may be in some measure able to trace the character of this great and singular personage.

It has already been mentioned, that in the early part of his life, Frederick had conceived a great inclination to travel. This passion seems not to have been extinguished by the splendor of his new situation; for having, soon after his accession, gone into Prussia and Westphalia to receive the homage of the inhabitants, he formed a resolution of proceeding *incognito* as far as Paris. Being discovered at Strasbourg, however, he laid aside the design of proceeding to Paris, and went to see his states in Lower Germany. Here he wrote the celebrated Voltaire, that he should come *incognito* to visit him at Brussels; but being seized with an indisposition in the little palace of Meuse, two leagues from Cleves, he wrote again to that philosopher, informing him that he expected he should make the first advances. The following curious account is given by him of his reception, &c. "The only guard I found at the gate was one soldier. The privy-counsellor, Bambonet, was cooling his heels in the court: he had large ruffles of dirty linen; a hat full of holes; and an old magisterial peruke, one end of which descended as low as his pockets, and the other scarcely reached his shoulder. I was conducted into his majesty's apartment, where there was nothing but bare walls. I perceived in a cabinet, by the glimmering of a taper, a truckle bed, two feet and an half wide, on which lay a little

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man muffled up in a night-gown of coarse blue cloth. Frederick. This was the king, in a strong perspiration, and even trembling under a wretched blanket in a violent fit of the ague. I bowed to him; and began by feeling his pulse, as if I had been his first physician. The fit over, he dressed himself and sat down to table. Algarotti, Kayserling, Maupertuis, the king's minister to the States General, and myself, were of the party; where we conversed profoundly on the immortality of the soul, on liberty, and the androgynes of Plato."

This rigid economy, and contempt of every luxury with regard to his own person, was maintained by Frederick as long as he lived. The following account, taken likewise from Voltaire, will give an idea of his manner of living. "He rose at five in the morning in summer, and six in winter. A lacquey came to light his fire, and dress and shave him; and indeed he almost wholly dressed himself. His room was not inelegant. A rich balustrade of silver, ornamented with little cupids, seemed to enclose an alcove bed, the curtains of which were visible; but behind them, instead of a bed, there was a library: the king slept on a truckle bed with a slight mattress concealed behind a screen. Marcus Aurelius and Julian, those apostles of Stoicism, did not sleep in a more homely manner. At seven his prime minister arrived with a great bundle of papers under his arm. This prime minister was no other than a clerk who had formerly been a soldier and valet de chambre. To him the secretaries sent all their dispatches, and he brought extracts of them, to which the king wrote answers in two words on the margin: and thus the affairs of the whole kingdom were expedited in an hour. Towards eleven the king put on his boots, reviewed his regiment of guards in the garden, and at the same hour the colonels were following his example in their respective provinces. The princes his brothers, the general officers, and one or two chamberlains, dined at his table; which was as good as it could be in a country where there is neither game, tolerable butcher's meat, nor a pullet, and where the very wheat is brought from Magdebourg. After the repast he retired alone into his cabinet, where he made verses till five or six o'clock. Then came a young man named D'Arget, formerly secretary to Valory the French envoy, who read to him. A little concert began at seven, in which the king played on the flute with as much skill as the first performer; and pieces of his composition were frequently executed. Supper was served in a little hall, the singular and striking ornament of which was a picture the design of which he had given to Pesne, one of our best colourists. It was a fine picture of Priapus. These repasts were not in general the less philosophic on that account. Never did men converse in any part of the world with so much liberty respecting all the superstitions of mankind, and never were they treated with more pleasantry and contempt. God was respected; but none of those who had deceived men in his name were spared. Neither women nor priests ever entered the palace. In a word, Frederick lived without a court, without counsel, and without religious worship."

As Frederick had espoused his princess entirely contrary to his inclination, it was imagined that on his accession to the throne he would embrace the opportunity of setting himself free from engagements so disagreeable

Frederick. able to himself. The queen was not without suspicions of this kind, inasmuch that she was on the point of fainting away when he made his first visit to her. To the surprise of all parties, however, he made her a very affectionate speech, apologizing for his indifference, and inviting her to participate with him the throne of which she was so worthy. In the first year of his reign he restored the academy of sciences at Berlin which had been founded in 1700; but he soon became disgusted with its members, whom he endeavoured at all times to ridicule rather than encourage. His war with the queen of Hungary, however, which took place almost immediately after his accession, for some time prevented him from taking such an active part in literary matters as he was naturally inclined to do. After the peace, being at liberty to follow his inclination, he gave full scope to his passion for literature; and in the interval betwixt the conclusion of the first war and beginning of that of 1756, he composed most of the works which are now ascribed to him. At this time he wrote his *History of my own Time*, afterwards announced among his posthumous works. In writing history he acquired a taste for historians; and justly gave the preference to the ancients, the most celebrated of whose works he perused every year. Voltaire was his principal literary correspondent, whom he invited to reside with him. Afraid of losing his liberty, however, that philosopher hesitated, excused himself, and entered into pecuniary treaties, first for himself, and afterwards for his niece Madam Dennis, whom he wished to accompany him. At last he was determined by seeing a poem from Frederick to M. D'Arnaud, in which the latter was compared to the rising, and Voltaire to the setting, sun. By this Voltaire was so much piqued, that he set out for Berlin without delay, and arrived there in June 1750. He was received in the most magnificent and affectionate manner, and for some time his situation was very agreeable; but the disputes and rivalry which took place betwixt him and Maupertuis soon threw every thing into confusion. In these the king interfered in such a manner as was certainly below his dignity; and he often exercised himself in making a jest of the other men of letters in a way exceedingly disgusting, and which induced many of them to leave him. The squabbles with Voltaire were sometimes very diverting; an account of some of which is given under the article VOLTAIRE. They ended at last in a final quarrel with that wit, and his departure from the kingdom. The restless disposition of Frederick showed itself after his departure, by his attempts to provoke the literati who remained at his court to quarrel with him as Voltaire had been accustomed to do. But they were of too passive a disposition to gratify him in this respect, choosing rather to suffer the most mortifying strokes of raillery, or to leave the kingdom altogether, than to contend with him. This proved so uneasy to the king, that he one day exclaimed, "Shall we have no more quarrels then?" The breaking out of the war in 1756, however, put a stop to this diversion, and afforded him as many enemies as he could wish. The exploits he performed during the seven years which this unequal contest lasted, are almost incredible*; and it is amazing how the fortitude and resolution of any person could enable him to sustain the difficulties which during this period he had

to encounter. In one fatal moment, indeed, even the resolution of Frederick was on the point of giving way. This happened after the battle of Colin, when his affairs seemed altogether desperate, before they were retrieved by the victory at Rossbach. At this time he wrote to his sister at Bareith, that he was on the point of putting an end to his own life; but as this resolution did not extinguish in him the love of glory, he wished to have it said that he made verses on the brink of the grave. With this view he wrote a long poetical epistle to the marquis d'Argens, in which he communicated to him his design, and bade him farewell. Happily, at last, the king's affairs took a better turn, and such desperate thoughts were laid aside. His constitution, however, was irreparably injured by the excessive fatigues he had sustained. Soon after the conclusion of the peace, his body began to bend, and his head to incline to the right side: by degrees he became very infirm; he was tormented with the gout, and subject to frequent indigestions. All his distempers, however, were borne with invincible patience; and, till a very short time before his death, he never ceased to attend his reviews, or visit the different provinces of his dominions. He has been known to review his troops, and gallop through all the ranks, as if he felt no pain, notwithstanding that an abscess which had broken out upon him, and approached to a suppuration, frequently, upon such occasions, touched the saddle. In August 1785 he impaired his health still farther by assisting at a review, where he was exposed without even a cloak to a heavy rain for four or five hours. On his return to Potsdam he was seized with a fever; and, for the first time, became unable to assist at the military exercises of Potsdam, which take place in September. His malady, however, did not prevent him from dictating the disposition of these exercises during the three days they lasted, and he always gave the word in preference of his generals and the foreigners of distinction then at Potsdam. About the end of autumn the fever left him, but was succeeded by a violent cough; and he continued free from the gout which had usually attacked him at this season. He was greatly weakened by the cough, which prevented him from sleeping; but this did not in the least interrupt him in the execution of business. Every morning, at four or five o'clock, he ordered the three cabinet secretaries to enter his apartment, where he dictated answers to their papers. It was not till after the dispatch of all his affairs that he saw a surgeon, or sometimes a physician, though he had a bad opinion of the physicians in general, whom he consulted on his distemper. In the evening he amused himself from five to eight with some of his society; and after that hour he passed the remainder of the time before he went to rest, in hearing some ancient authors read to him; and thus he continued to employ himself till the very day before he died. On the 17th and 18th of May 1786, he was unable to assist at the ordinary reviews, but still he hoped to be present at those of Silesia. He several times attempted to mount his horse to go to the parade at Potsdam; but finding his powers insufficient, he was obliged to return, after having proceeded a few paces. He made other attempts, but with as little success; and at last his disorder terminated in a dropsy. Being now no longer able to remain in bed, he sat day and night in

* See Pref.
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Frederick. an arm chair with springs which could be moved at pleasure. For near a month before his death the swelling of his feet gave him violent pain, so that he wished an incision to be made; but the surgeon refused to perform the operation, suspecting that it might hasten his death. Nature, however, accomplished his desires; his right leg opened, and discharged such a quantity of matter, that he was greatly relieved; and those unacquainted with the medical art began to entertain hopes of his recovery. The physicians, however, were of a very different opinion; and the event justified their apprehensions. On the 16th of August 1786 his throat began to rattle violently, and his attendants expected every moment that he would breathe his last. In this situation his three secretaries entered the room for the dispatch of business as usual. Even then Frederick made an effort to collect his force, giving them a sign to wait, as if he would speak with them in a short time. This, however, was the last he could make: for he soon after fell into a stupor; though from this he recovered so far as to be able to speak. In the evening he asked what o'clock it was? and on being answered that it was nine, he said, "Well then, I am going to rest." His respiration and voice became gradually more feeble; and he expired on Thursday at 19 minutes after two in the morning, without any convulsion or symptom of pain.

This great monarch was of the middle size, had large blue eyes and a piercing look. He spoke German incorrectly, and in a very rough manner; but talked French very fluently, and his voice was then mild and agreeable. His constitution was naturally feeble, but he had greatly improved it by his activity and laborious life. He had the art of relieving every one from that embarrassment which frequently occurred in accosting such a celebrated monarch; and it seems probable that he himself considered on what he should say to any illustrious person who happened to come to his court. His universal knowledge enabled him to converse on all subjects; and thus he talked of war with military men, of verses with the poet, of agriculture with the farmer, jurisprudence with the lawyer, commerce with the merchant, and politics with the Englishman. He had a very retentive memory; was fond of solitude and gardening; and likewise took great pleasure in dogs, of which animals he constantly kept a number about him, giving them little balls covered with leather to play with. In company, he was fond of asking questions and jesting; in which last he proceeded such lengths as undoubtedly were unbecoming in a superior towards his inferiors, who would not have failed to resent such jokes from persons more on an equality with them. In military affairs he was excessively severe, not to say cruel; of which the following anecdote may serve as an instance. In the first war of Silesia, wishing to make some alterations in his camp during the night, he forbade every person, under pain of death, to keep, after a certain hour, a fire or other light in his tent. He himself went the rounds; and in passing the tent of a captain Ziern he perceived a light. Entering the tent, he found the captain sealing a letter to his wife, for whom he had a great affection. "What are you doing there?" (says the king :) "Do you not know the order?" The captain fell on his knees and asked pardon, but did not at-

tempt to make any excuse. "Sit down (says Frederick), and add a few words I am going to dictate to you." Ziern obeyed; and the king dictated, "Tomorrow I shall perish on a scaffold." The unfortunate man wrote them, and next day was executed. In matters of domestic legislation, he was more arbitrary than just; of which we have a notable example in the famous case of Arnold the miller. The man had refused to pay the rent of the mill he possessed, on pretence that the stream which turned it had been diverted into a fish-pond. This was evidently a frivolous excuse; because the water which ran into the pond also ran out of it into the same channel as before, so that nothing could be lost except what evaporated from the surface of the fish-pond. The judges therefore gave sentence against the miller; but the king not only reversed their sentence, but disgraced them. For this he was celebrated through all the newspapers in Europe; and yet he was in the wrong, and afterwards even acknowledged himself to have been so: but, notwithstanding he knew his error, he not only made no reparation to the parties he had injured, but allowed them to lie in prison at Spandau all his lifetime, so that they were not released till the commencement of the present reign. He entertained certain and almost unaccountable prejudices against certain places and persons, which neither conduct nor merit could eradicate. One of these unfortunate places was Westphalia, on which he never conferred any bounty: and one day a native of that country, a man of great merit, being proposed to him for a place, he refused, saying, "He is a Westphalian; he is good for nothing." Voltaire accuses him of ingratitude to the Count de Seckendorf; who, as we have already seen, saved his life, and against whom he afterwards conceived the most implacable hatred. His indifference towards those who afforded him the most essential service, was evident: when a robust butcher prevented him from falling, horse and all, over a precipice, where both would have undoubtedly been killed; the king, sensible of the assistance that had been afforded him, turned about, and saying, "Thank you, friend," rode off without ever inquiring farther about the person who had just preserved him from destruction.

With regard to the literary merits of this monarch, we certainly cannot pronounce them extraordinary. Voltaire boasts of having corrected his works, and others of having furnished him with materials for his history. He has been accused of borrowing whole hemistichs of poetry from Voltaire, Boileau, Rousseau, and others; nor does the charge appear to be at all void of foundation. Such of his verses as appear to have undergone no correction, are very indifferent, nor indeed can we pronounce any of his poetic works to be of the first rate. In the former part of his life he entertained a great partiality for the French learning and language; but as he advanced in years, he entirely lost this predilection, and inclined much more to favour the English and Germans. Towards the end of his life, indeed, he affected a contempt for the French, without whom it is said he would scarce ever have made any figure except in the military line.

FREDERICKSBURG, a fort and colony of Brandenburg, on the gold-coast of Guinea, in Africa, near Cape Three-points, and about 75 miles from Cape.

Frederick, Fredericksburg.

Frederick-shall Cape Coast. It mounts 46 pieces of cannon on four batteries; and formerly belonged to the Prussians, but is now subject to Denmark. W. Long. 1. 15. N. Lat. 4. 30.

Free-Stone.

FREDERICKSHALL, or **FREDERICKSTADT**, a strong town of Norway, in the prefecture of Agerhuys, where Charles XII. king of Sweden was killed by a musket-ball in 1718, when he was besieging this town. It is seated on the coast of the Catagate, in E. Long. 10. 45. N. Lat. 59. 2.

FREDERICKSODE, a town of Denmark, in Jutland, taken by the Swedes in 1657, but now subject to Denmark. It is seated near the sea, in E. Long. 10. 0. N. Lat. 55. 42.

FREDERICKSTADT, a town of Denmark, in South Jutland, built in 1621. It is seated on the river Eyder, in E. Long. 9. 23. N. Lat. 55. 32.

FREDERICKSTADT, a town of Norway, in the province of Agerhuys, seated on a bay of the sea, near the frontiers of Sweden, in E. Long. 11. 6. N. Lat. 59. 12.

FREE, in a general sense, is used in opposition to whatever is constrained or necessitated. When applied to things endowed with understanding, it more peculiarly relates to the liberty of the will.

Free-Bench, signifies that estate in copy-hold which the wife, being espoused a virgin, has after the decease of her husband for her dower, according to the custom of the manor.

In regard to this free-bench, different manors have different customs: and in the manor of east and west Enbourne in the county of Berks, and in other parts of England, there is a custom, that when a copyhold tenant dies, the widow shall have her free-bench in all the deceased husband's lands, *dum sola & casta fuerit*, "whilst she lives single and chaste;" but if she is found to be guilty of incontinency, she shall forfeit her estate. Nevertheless, upon her coming into the court of the manor riding backwards on a black ram, with his tail in her hand, rehearsing a certain form of words, the steward is bound by custom to restore her to her free-bench. The words are,

Here I am,
Riding on a black Ram,
Like a whore as I am;
And for my erincum crancum
Have lost my bincum bancum,
And for my tail's game
Have done this worldly shame:

Therefore, pray Mr Steward, let me have my land again

Free or Imperial Cities in Germany, are those not subject to any particular prince; but governed, like republics, by their own magistrates.

There were free cities, (*liberæ civitates*), even under the ancient Roman empire: such were those to whom the emperor, by the advice or consent of the senate, gave the privilege of appointing their own magistrates, and governing themselves by their own laws. See **CITY**.

Free Fishery. See **Free FISHBERRY**.

Free Warren. See **WARREN**.

Free-Mason. See **MASON**.

Free-Stone, a whitish stone, dug up in many parts of Britain, that works like alabaster, but is more hard and durable; being of excellent use in build-

ing, &c. It is a kind of the grit stone, but finer **Free-Stone** sanded and smoother; and is called *free*, from its being of such a constitution as to cut freely in any direction. **Freehold.**

The qualities of the several kinds of free-stones used in the different parts of Europe are very different. They all agree in this general property indeed, that they are softer while in the quarry, than when they have been some time exposed to the air: but even this general property differs greatly in degree. They have a sort of grey free-stone in use at Paris (of which we do not yet seem to have met with any in this country), which has the abovementioned quality in so great a degree, that the expence of working it is in a great measure saved.

This stone lies every-where on the south-side of the river Seine, and is of a coarse and large grit. It is so soft when newly taken out of the strata, that they fashion it very conveniently with a sort of broad ax, and form as many stones for building in this manner in an hour, as an equal number of our people do in a day or two. Though this stone is as soft as dry clay when first taken up, it is found to harden so considerably in the air, that it becomes more than equal to our ordinary free-stone.

Our Portland stone of the finest kind, which is white, and of a close grit, is very fit for hewing and carving; but it will neither resist water nor fire, which is a very singular instance in so dense a stone; while the free-stone of Kent, which is less beautiful to the eye, and is of a greyish colour, and considerably close, though of a larger grain, resists the air and water very well. The free-stone of Derbyshire, on the other hand, is so brittle as to be unfit for any fine working; and so coarse and open in its texture, that it lets water through: yet it bears the fire extremely well, and is fit for ovens, hearths, &c.

FREEBOOTER, or **FLIBUSTER**, a name given to the pirates who scour the American seas, particularly such as make war against the Spaniards. See **BUCA-NEER**.

FREEDOM, in general, the state or quality of being free. See **LIBERTY**.

FREEDOM of a Corporation, the right of enjoying all the privileges and immunities belonging to it. See **CORPORATION**.

The freedom of cities, and other corporations, is regularly obtained by serving an apprenticeship; but it is also purchased with money, and sometimes conferred by way of compliment.

FREEDOM of Conscience. See **TOLERATION**.

FREEDOM of the Will, that power or faculty of the mind, whereby it is capable of acting or not acting, choosing or rejecting whatever it judges proper †. Of this every man must be sensible, who finds in himself *† See Metaphysic.* a power to begin or forbear, continue or end several actions, barely by a thought or preference of the mind.

FREEHOLD, **FRANK TENEMENT**, (*liberum tenementum*), is land, or tenement, which a man holds in *fee-simple*, *fee-tail*, or for term of life. See **Fee** and **TAIL**.

Freehold is of two kinds, in *deed* and in *law*.

The first is the real possession of land or tenement

Freehold ment in fee, fee-tail, or for life : the other is the right a man has to such land or tenement before his entry or seizure.

A freehold, by the common law, cannot commence *in futuro* ; but it must take effect presently, either in possession, reversion, or remainder. Whatever is part of the freehold goes to the heir ; and things fixed thereto may not be taken in distress for rent, or in execution, &c. No man shall be disseised of his freehold by stat. Magna Charta, cap. 29. but by judgment of his peers, or according to the laws of the land : nor shall any distrain freeholders to answer for their freehold, in any thing concerning the same, without the king's writ. Freehold estates, of certain value, are required by statutes to qualify jurors, electors of the knights of the shire in parliament, &c.

FREEHOLD is likewise extended to such offices as a man holds in fee, or for life.

FREEHOLD is also sometimes taken in opposition to villenage.

Lambard observes, that land, in the Saxons time, was distinguished into *bockland*, i. e. holden by book or writing ; and *fokland*, held without writing. The former, he says, was held on far better condition, and by the better sort of tenants, as noblemen and gentlemen ; being such as we now call *freehold* : the latter was mostly in possession of peasants ; being the same with what we now call *at the will of the lord*.

In the ancient laws of Scotland, freeholders are called *milites*, "knights." In Reg. Judicial. it is expressed, that he who holds land upon an execution of a statute merchant, until he hath satisfied the debt, *tenet ut liberum tenementum sibi et assignatis suis* ; and the same of a tenant *per eligit* : the meaning of which seems to be, not that such tenants are freeholders, but as freeholders for the time, till they have received profits to the value of their debt.

FEETHINKER. See **DEIST**.

FREEZE, FRIEZE, or Frize, in commerce. See **FRIZE**.

FREEZE, in architecture, that part of the entablature of columns, between the architrave and cornice.

The freeze is properly a large flat face, or member, separating the architrave from the cornice.

The ancients called it *zoophorus*, (*ζωοφορος*), because it was usually enriched with figures of animals ; and our denomination *freeze* has a like origin, being formed of the Latin *phrygio*, "an embroiderer," because it is commonly adorned with sculptures in basso-relievo, imitating embroidery.

FREEZING, in philosophy, the same with congelation. See **CONGELATION**, **FROST**, and **ICE**.

FREEZING Rain, or Raining Ice, a very uncommon kind of shower, which fell in the west of England, in December 1672 ; whereof we have divers accounts in the Philosophical Transactions.

This rain, as soon as it touched any thing above ground, as a bough or the like, immediately settled into ice ; and by multiplying and enlarging the icicles, broke all down with its weight. The rain that fell on the snow immediately froze into ice, without sinking in the snow at all.

It made an incredible destruction of trees, beyond any thing in all history. "Had it concluded with

some gust of wind (says a gentleman on the spot), it might have been of terrible consequence. I weighed the sprig of an ash tree, of just three-quarters of a pound ; the ice on which weighed 16 pounds. Some were frightened with the noise in the air ; till they discerned it was the clatter of icy boughs, dashed against each other." Dr Beale observes, that there was no considerable frost observed on the ground during the whole ; whence he concludes, that a frost may be very intense and dangerous on the tops of some hills and plains ; while in other places it keeps at two, three, or four feet distance above the ground, rivers, lakes, &c. and may wander about very furious in some places, and remits in others not far off. The frost was followed by glowing heats, and a wonderful forwardness of flowers and fruits.

FREIGHT, in navigation and commerce, the hire of a ship, or a part thereof, for the conveyance and carriage of goods from one port or place to another ; or the sum agreed on between the owner and the merchant, for the hire and use of a vessel. See **Maritime LAWS**.

FREIND (John), a most learned English physician and writer in the 18th century, was born at Croton, Northamptonshire, in 1675. In 1696, he published, in conjunction with Mr P. Foulkes, an edition of two Greek orations, one of *Æschines* against Ctesiphon, and the other of Demosthenes *de Coronâ*, with a new Latin version. In 1699, he wrote a letter to Dr Sloane concerning an *Hydrocephalus*, published in the Philosophical Transactions ; and another letter in Latin to the same gentleman, *De spasmo rario: historia*, printed in the same Transactions. In 1703, his *Emmenologia* appeared ; which gained him great reputation. In 1704, he was chosen professor of chemistry in the university of Oxford. In 1705, he attended the earl of Peterborough to Spain, as physician to the army there ; and upon his return in 1707, published an account of the earl's expedition and conduct. In 1709, he published his Chemical Lectures. In 1712, he attended the duke of Ormond in Flanders, as his physician. In 1716, he was admitted a fellow of the college of physicians in London. This year he published the first and third books of Hippocrates *De morbis popularibus*, with a Commentary on Fevers, written by himself. He sat a member for the borough of Launceston in Cornwall in 1722, where he distinguished himself by his opposition to the administration. March 1722, he was committed to the tower on a charge of high-treason : and while he was under confinement, he wrote a Latin epistle to Dr Mead, *De quibusdam variolarum generibus* ; and began his History of Physic, the first part of which was published in 1725, and the second in 1726. Upon the accession of George II. to the throne, he was appointed physician in ordinary to the queen, who showed the utmost regard and esteem for him. He died at London in 1728. His works were published together in Latin at London, 1733, in folio, and dedicated to the queen.

FREINSHEMIUS, a learned and elegant author, born at Ulm in 1608. He made Supplements to Livy, Tacitus, and Q. Curtius, in 60 books, printed at Strasburg in 1654. He wrote likewise Notes upon Q. Curtius, Florus, Tacitus, and some other Latin authors ; and died in 1660.

FREITS.

Freight
Freinshe-
mius.

Freits,
French.

FREITS. See FREATS.

FRENCH, in general, something belonging to France: thus we say, the French language, French customs, polity, &c.

The French language, as it now stands, is no original or mother language, but a medley of several. Those that prevail most, and which are, as it were, the basis thereof, are, 1. The Celtic; whether that were a particular language itself, or whether it were only a dialect of the Gothic, as spoke in the west and north. 2. The Latin, which the Romans carried with them into Gaul, when they made the conquest thereof. And, 3. The Teutonic, or that dialect of the Teutonic spoke by the Franks, when they passed the Rhine, and established themselves in Gaul. Of these three languages, in the space of about thirteen hundred years, was the present French formed, such as it is now found. Its progress was very slow; and both the Italian and Spanish were regular languages long before the French.

Pasquier observes, it was under Philip de Valois, that the French tongue first began to be polished; and that, in the register of the chamber of accounts of that time, there is a purity seen almost equal to that of the present age. However, the French was still a very imperfect language till the reign of Francis I. the custom of speaking Latin at the bar, and of writing the public acts and instruments of the courts of justice in that language, had made them overlook the French, their own language. Add, that the preceding ages had been remarkable for their ignorance, which was owing, in good measure, to the long and calamitous wars which France had been engaged in: whence the French noblesse deemed it a kind of merit not to know any thing; and the generals regarded little whether or no they wrote and talked politely, provided they could but fight well.

But Francis I. who was the restorer of learning, and the father of the learned, changed the face of things; and after his time, Henry Stevens printed his book, *De la Precellence du Langage François*. The change was become very conspicuous at the end of the 16th century; and under Henry IV. Amyot, Coeffeteau, and Malherbe, contributed towards bringing it to its perfection; which the Cardinal De Richelieu completed, by the establishment of the French academy; an assembly, wherein the most distinguished persons of the church, the sword, and the gown, have been members. Nor did the long reign of Louis XIV. contribute a little to the improvement of the language: the personal qualities of that prince, and his taste for the fine arts, and that of the princes of the blood, rendered his court the politest in Europe. Wit and magnificence seemed to vie; and his generals might have disputed with the Greeks, Romans, &c. the glory of writing well, if they could not that of fighting. From court, the elegance and purity of the language soon spread itself into the provinces; and now there is scarce any body there who does not write and speak good French.

One of the characters of the French language is, to be natural and easy. The words are ranged in it much in the same order as the ideas in our minds; in which it differs exceedingly from the Greek and Latin, where the inversion of the natural order of words is reputed a

beauty. Indeed the Hebrew surpasses even the French in this point; but then it comes short of it in copiousness and variety.

It must be added, however, that as to the analogy of grammar, and the simplicity wherewith the moods of verbs are formed, the English has the advantage not only over the French, but over all the known languages in the world; but then the turns, the expressions, and the idioms, of the English, are sometimes so quaint and extraordinary, that it loses a good deal of the advantage which its grammatical simplicity gives it over the rest.

The French has but few compound words; wherein it differs widely from the Greek, High Dutch, and English. This the French authors own a great disadvantage in their language; the Greek and Dutch deriving a great part of their force and energy from the composition of words, and frequently expressing that in one sounding word, which the French cannot express but by a periphrasis. The diminutives in the French are as few as the compounds; the greatest part of those remaining in use having lost their diminutive signification; but what distinguish the French most, are its justness, purity, accuracy, and flexibility.

French is the most universal and extensive language in Europe. The policy of states and courts has rendered it necessary for the ministers of princes, and their officers, &c. and the taste of arts and sciences has had the same effect with regard to the learned. In Germany, and elsewhere, the princesses and persons of distinction value themselves on understanding French; and in several courts of Europe, French is almost as much known as the language of the country.

FRESCATI, or FRASCATI, a small town, situated on the brow of a hill, about twelve miles to the eastward of Rome. It derives its name from the coolness of the air, and *fresh* verdure of the fields around. It is built on the ruins of the ancient Tusculum; and the Tusculan villa where Cicero wrote his famous questions is at a place now called *Grotta Ferrata*, about two miles distant. E. Long. 11. 43. N. Lat. 41. 48. There is a very fine prospect from this town into the neighbouring country, which abounds with the seats of cardinals and other nobility. It is the see of a bishop, who is one of the six senior cardinals, and is surrounded by some of the most beautiful villas in Italy; the principal of which are the villa Aldrobandini, belonging to prince Pamfili; the villa Taberna, belonging to prince Borghese; and villa Ludovisi, to the family of Colonna. The villa Aldobrandini, called also *Belvedere* from its beautiful prospect, is the most remarkable, on account of its fine situation, extensive gardens, airy terraces, its grottos, cascades, and waterworks. Over a saloon, near the grand cascade, is the following inscription:

*Huc ego migravi musis comitatus Apollo;
Hic Delphi, hic Helicon, hic mihi Delos erit.*

The walls are adorned with a representation of Apollo and the muses; and some of that god's adventures are painted in fresco by Domenichino. The villa Taberna is one of the finest and best furnished of any in the neighbourhood of Rome. From this you ascend thro' gardens to Monte Dracone, another palace on a more lofty situation, belonging also to that prince, and deriving its name from the arms of his family. From
hence:

French,
Frescati.

Fresco. hence you may see Rome, and the whole extent of the plain: it has a noble ascent, with a broad paved walk; and among other curiosities there is a hall adorned with the pictures of a vast number of eminent men for learning and arms. The gardens, laid out by Vignola, contain three miles in compass; and have many delightful walks, with curious water-works. Near this place are the monks of Camaldoli and the capuchins; and higher up are ruins of the ancient Tusculum. Ascending towards the plain, two miles on the right-hand, you find the famous abbey of Grotta Ferrata, belonging to the monks of St Basil, and situated on the ruins of Cicero's house. The virgin Mary of the great altar is an ancient Greek picture; in the chapel the pictures of St Nilus and St Bartholomew the abbot, are by Annibal Caracci; and all the paintings in fresco of this chapel are by Domenichino. Villa Ludovisia has a charming walk going up to it, where you see the ruins of Lucullus's palace. The house is small; but the gardens are large, embellished with a great variety of walks and fountains, and a beautiful cascade.

FRESCO, a method of painting in rilievo on walls, so as to endure the weather. It is performed with water-colours on fresh plaster, or on a wall laid with mortar not yet dry. This sort of painting has a great advantage by its incorporating with the mortar, and drying along with it, becomes very durable. The Italians, from whom we borrow the term, call it *fresco*; because it is frequently used for walls, alcoves, and other buildings in the *open air*. Vitruvius, lib. vii. cap. 4. calls it *udo testorio*.

Painting in fresco is very ancient, having been practised in the earliest ages of Greece and Rome. It is chiefly performed on walls and vaults, newly plastered with lime and sand; but the plaster is only to be laid, in proportion as the painting goes on; no more being to be done at once than the painter can dispatch in a day, while it dries. Before he begins to paint, a cartoon or design is usually made on paper, to be calked, and transferred to the wall, about half an hour after the plaster is applied.

The ancients painted on stucco; and we may remark in Vitruvius what infinite care they took in making the incrustation or plastery of their buildings to render them beautiful and lasting; though the modern painters find a plaster made of lime and sand preferable to it; both as it does not dry so hastily, and as being a little brownish, it is fitter to lay colours on, than a ground so white as stucco.

In this kind of painting, all the compound and artificial colours, and almost all the minerals, are set aside, and scarce any thing is used but earths; which are capable of preserving their colour, defending it from the burning of the lime, and resisting its salt, which Vitruvius calls its bitterness.

For the work to come out in all its beauty, the colours must be laid on quick, while the plaster is yet moist; nor should they ever be retouched, dry, with colours mixed up with the white of an egg, or size, or gum, as some workmen do; because such colours grow blackish; nor do any preserve themselves, but only such as were laid on hastily at first.

The colours used are white made of lime flaked long before, and white marble dust; ochre, both red and

yellow; verditer; lapis lazuli; smalt; black chalk, &c. All which are only ground, and worked up with water; and most of them grow brighter and brighter as the fresco dries.

The brushes and pencils for this work ought to be long and soft, otherwise they will rake and raise the painting. The colours should be full, and flowing from the brush; and the design perfect: for in this work you cannot alter or add upon any colour.

FRESH-WATER, is that not tinged or impregnated with salt or saline particles, enough to be discoverable by the sense. Such generally is that of springs, rains, wells, lakes, &c.

The dulcifying or making of salt water fresh is a secret that has been long sought with great attention. For an account of the principal attempts that have been made with this view, see *Sea-WATER*.

FRESH Wind signifies strong, but not violent; hence when the gale increases, it is said to freshen.

FRESHES, in sea-language, denotes the impetuosity of an ebb-tide, increased by heavy rains, and flowing out into the sea, often discolouring it to a considerable distance, and forming a line that separates the two colours, and which may be distinctly perceived for a great length along the coast.

FRESHES, a local term signifying annual inundations, from the rivers being swollen by the melted snows and other fresh waters from the uplands, as is the Nile, &c. from periodical or tropical rains. As a sailor's term, it is opposed to marine or salt-water floodings, tides, &c. The word is of common use in America, where the inundations so called are of great service. They bring down the soil to the intervals below, and form a fine mould, producing corn, grain, and herbage, in the most luxuriant plenty. They also afford another benefit, in regard to many rivers in America, viz. in equalizing the surface of the stream (where rapid falls, or cascades, obstruct the navigation), so that rafts of timber and other gross produce are then floated down to the sea-ports in great quantities.

FRESNOY (Charles Alphonse du), an excellent poet and painter, was born at Paris in 1611. He was instructed there by Perrier and Simon Vouet in painting; but he did not long adhere to Vouet's manner of colouring; for as soon as he fixed himself at Rome, he made the works of Titian the models for his imitation. He was, however, more celebrated as a poet than as a painter; and gave more attention to the theory than to the practice of the pencil. Accordingly, he is better known by his incomparable poem *De arte graphica*, than by his performances on the canvas: and on this poem he bestowed so much pains, that he died in 1665, before it was published. It was printed afterward with a French prose translation and notes by M. de Piles; and was translated into English by Mr Dryden, who prefixed to it an original preface containing a parallel between painting and poetry.

FRET, or **FRETTE**, in architecture, a kind of knot or ornament, consisting of two lifts or small fillets variously interlaced or interwoven, and running at parallel distances equal to their breadth.

FRET, in heraldry, a bearing composed of six bars, crossed and variously interlaced. Some call it the *truelover's knot*. See **HERALDRY**.

FRET,

Fresh
||
Fret.

Fret
||
Friburg.

FRET, in music, signifies a kind of stop on some instruments, particularly bass-viols and lutes. Frets consist of strings tied round the neck of the instrument, at certain distances, within which such and such notes are to be found.

FRET-Work, that adorned with frets. It is sometimes used to fill up and enrich flat empty spaces; but it is mostly practised in roofs, which are fretted over with plaster work.

FRETTS, in mineralogy, a term used by our miners to express the worn side of the banks of the rivers in mine-countries, where they search for the shod stones or grews washed down from the hills, in order from thence to trace out the running of the shod up to the mine.

FRETTS, *Freats*, or *Frcits*. See **FREATS**.

FRIABLE, among naturalists, an appellation given to bodies that are easily crumbled to pieces: such are pumice and all calcined stones.

FRIAR, or **FRIER**, by the Latins called *frater*, the Italians *fra*, and the French *frere*, that is, *brother*: a term common to the monks of all orders; founded on this, that there is a kind of fraternity or brotherhood presumed between the several religious persons of the same convent or monastery.

Friars are generally distinguished into these four principal branches, viz. 1. Minors, grey friars, or franciscans. 2. Augustines. 3. Dominicans, or black friars. 4. White friars or carmelites. From these four the rest of the orders descend. See **FRANCISCANS**, **AUGUSTINES**, &c.

FRIAR, in a more peculiar sense, is restrained to such monks as are not priests; for those in orders are usually dignified with the appellation of *father*.

FRIARS Observant (*fratres observantes*), were a branch of the Franciscans; thus called, because not combined together in any cloister, convent, or corporation, as the conventuals are; but only agreed among themselves to observe the rules of their order, and that more strictly than the conventuals did, from whom they separated themselves out of a singularity of zeal, living in certain places of their own choosing.

FRIBURG, a large town of Germany, and capital of Brisgaw; remarkable for the steeple of the great church, which, next to that of Strasburg, is the finest in Germany; and for its university. The inhabitants are famous for polishing crystal and precious stones. It has been several times taken and retaken; particularly by the French in 1744, who demolished the fortifications. It is seated on the river Triser, ten miles east of Brisach, and 30 south of Strasburgh. E. Long. 7. 57. N. Lat. 48. 4.

FRIBURG, a town of Switzerland, and capital of the canton of the same name, seated on the river Sane, in E. Long. 7. 5. N. Lat. 46. 50. Its situation is most singular and picturesque: "It stands partly in a small plain, partly on bold acclivities on a ridge of rugged rocks, half encircled by the river Sane; and is so entirely concealed by the circumjacent hills, that the traveller scarcely catches the smallest glimpse, until he bursts upon a view of the whole town from the overhanging eminence. The fortifications, which consist of high stone-walls and towers, inclose a circumference of about four miles; within which space the eye comprehends a singular

mixture of houses, rocks, thickets, and meadows, varying instantly from wild to agreeable, from the bustle of a town to the solitude of the deepest retirement. The Sane winds in such a serpentine manner as to form in its course, within the space of two miles, five obtuse angles, between which the intervening parts of the current are parallel to each other. On all sides the descent to the town is extremely steep: in one place the streets even pass over the roofs of the houses. Many of the edifices are raised in regular gradation like the seats of an amphitheatre; and many overhang the edge of a precipice in such a manner, that on looking down, a weak head would be apt to turn giddy. But the most extraordinary point of view is from the Pont-neuf. To the north-west, part of the town stands boldly on the sides and the piked back of an abrupt ridge; and from east to west a semicircle of high perpendicular rocks is seen, whose base is washed and undermined by the winding Sane, and whose tops and sides are thinly scattered with shrubs and underwood. On the highest point of the rocks, and on the very edge of the precipice, appears, half-hanging in the air, the gate of the town called *Bourguillon*: a stranger standing on the bridge would compare it to Laputa, or the Flying Island in Gulliver's Travels; and would not conceive it to be accessible but by means of a cord and pulleys. The houses, constructed with a grey sand-stone, are neat and well built; and the public edifices, particularly the cathedral, are extremely elegant. The inhabitants are Roman Catholics, as are those of the whole canton. The bishop of Lausanne, called here the bishop of Friburg, resides in this city. He is appointed by the pope, usually at the recommendation of the French court; and his revenues, including a small pension from France, and from the abbey of Hauterive, of which he was abbot, amount to about L. 400 *per annum*. His diocese extends over the whole canton, and part of that of Soleure. In all his acts and deeds he signs himself bishop and count of Lausanne, and prince of the German empire. The sovereign power resides in the great council of two hundred; comprising the two advocates, the chancellor, the grand sautier, the senate or little council of twenty-four, the sixty, from which body are chosen the bannerets and principal magistrates, and the remaining hundred and twelve members, who are simply denominated burghers."

FRIBURG (the canton of), and one of the 13 republics of Switzerland. It is surrounded on all sides by the canton of Bern. The land is fertile in corn, fruits, and pastures; and it is said the canton can send 18,000 men into the field. This canton is entirely catholic.

FRICASSEE, a dish or mess hastily dressed in a frying-pan, and seasoned with butter, oil, or the like. The word is French, formed of the Latin *frisatura*, "frying." Others will have fricassée formed in imitation of the noise made by butter, or other fat, when melted in the pan. We say a fricassée of pullets, of rabbits, of fench, of tripe, of frogs, of eggs, of peas, &c.

FRICENTI, an episcopal town of Italy, in the kingdom of Naples, and in the farther principato, near the river Tripalto, in E. Long. 14. 13. N. Lat. 40. 59.

FRICITION, the act of rubbing or grating the surface of one body against that of another, called

Friburg
||
Friction.

Friction. also *attrition*. The phenomena arising upon the friction of divers bodies, under different circumstances, are very numerous and considerable. Mr Hawksbee gives us a number of experiments of this kind; particularly of the attrition or friction of glass, under various circumstances, the result of which was, that it yielded light and became electrical. All bodies by friction are brought to conceive heat; many of them to emit light; particularly a cat's back, sugar, beaten sulphur, mercury, sea-water, gold, copper, &c. but, above all, diamonds, which, when briskly rubbed against glass, gold, or the like, yield a light equal to that of a live coal when blowed by the bellows. See **ELECTRICS** and **ELECTRICITY**.

FRICTION, in mechanics, denotes the resistance a moving body meets with from the surface on which it moves. Friction arises from the roughness or asperity of the surface of the body moved on, and that of the body moving: for such surfaces consisting alternately of eminences and cavities, either the eminences of the one must be raised over those of the other, or they must be both broke and worn off; but neither can happen without motion, nor can motion be produced without a force impressed. Hence, the force applied to move the body is either wholly or partly spent on this effect; and consequently there arises a resistance or friction, which will be greater, *ceteris paribus*, as the eminences are the greater and the substance the harder: and as the body, by continual friction, becomes more and more polished, the friction diminishes. See **MECHANICS**.

FRICTION, in medicine and surgery, denotes the act of rubbing a diseased part with oils, unguents, or other matters, in order to ease, relieve, and cure it. Frictions are much used of late in venereal cases. They prefer the applying of mercury externally by way of friction, to that of giving it internally, to raise a salivation.

There are also frictions with the flesh-brush, a linen cloth, or the hand only. These frictions are a sort of exercise which contributes greatly to health; as they excite and stir up the natural warmth, divert desfluxions, promote perspiration, open the pores of the skin, and carry off stagnant humours.

The flesh-brush (Dr Cheyne observes) is an exercise extremely useful for promoting a full and free perspiration and circulation. Every body knows the effect of currying horses; that it makes them sleek, gay, lively, and active; so as even to be judged equivalent to half the feeding. This it can no otherwise effect, but by assisting nature to throw off the recrements of the juices, which stop the free circulation, and, by constant friction, irritation, and stimulation, to bring the blood and spirits to the parts most distant from the seat of heat and motion; and so plump up the superficial muscles. And the same effect it would have in other creatures, and man himself, if managed in the same manner, and with the same care and regularity. Persons, therefore, of weak nerves and sedentary lives, would do well to supply the want of other exercise with spending half an hour, morning and night, in currying and rubbing their whole body, especially their limbs, with a flesh-brush. But this means of health is most advantageously used when the *prima vie* are most empty.

N^o 132.

FRIDAY, the sixth day of the week; so named of *Freyra*, a Saxon deity. By the Romans it was called *dies Veneris*. See **FREA**.

Good FRIDAY. See *Good-Friday*.

FRIDBURG, an imperial town of Germany, in Wetteravia. It is seated on a mountain, in E. Long. 8. 50. N. Lat. 50. 14. It was formerly much more considerable than at present.

FRIDSTOL, mentioned, in our ancient writers, among the immunities granted to churches, signifies a seat, chair, or place of peace and security, where criminals might find safety and protection: of these there were many in England; but the most famous were that at Beverly, and that in St Peter's church at York, granted by charter of king Henry I.

FRIENDLY ISLANDS, a cluster of islands in the Pacific Ocean, so named by Captain Cook in the year 1773, on account of the friendship which appeared to subsist among the inhabitants, and from their courteous behaviour to strangers. Abel Jansen Tasman, an eminent Dutch navigator, first touched here in 1643, and gave names to the principal islands. Captain Cook laboriously explored the whole cluster, which he found to consist of more than 60. The three islands which Tasman saw he named *New Amsterdam*, *Rotterdam*, and *Middleburgh*. The first is the largest, and extends about 21 miles from east to west, and about 13 from north to south. These islands are inhabited by a race of Indians, who cultivate the earth with great industry. The island of Amsterdam is intersected by straight and pleasant roads, with fruit-trees on each side, which provide shade from the scorching heat of the sun. The chief islands are Annamooka, Tangataboo (the residence of the sovereign and the chiefs), Lefooga, and Eooa. Lefooga is about 7 miles long, and in some places not above two or three broad. It is in many respects superior to Annamooka. The plantations are both more numerous and more extensive; and inclosed by fences which, running parallel to each other, form fine spacious public roads, which would appear beautiful in countries where rural conveniences have been carried to the greatest perfection. They are, in general, highly cultivated, and well-stocked with the several roots and fruits which these islands produce; and Captain Cook endeavoured to add to their number by planting Indian corn, and the seeds of melons, pumpkins, and the like. Eooa, when viewed from the ship at anchor, formed one of the most beautiful prospects in nature, and very different from the others of the Friendly Isles; which being low and perfectly level, exhibit nothing to the eye but the trees which cover them: whereas here, the land rising gently to a considerable height, presents us with an extensive prospect, where groves of trees are only interspersed at irregular distances, in beautiful disorder, and all the rest is covered with grass, except near the shores, where it is entirely covered with fruit and other trees; amongst which are the habitations of the natives. In order to have a view of as great a part of the island as possible, Captain Cook and some of his officers walked up to the highest point of the island. From this place they had a view of almost the whole island, which consisted of beautiful meadows of prodigious extent, adorned with tufts of trees, and intermixed with plantations. 'While I was surveying this delightful

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prospect (says Captain Cook), I could not help flattering myself with the pleasing idea that some future navigator may, from the same station, behold these meadows stocked with cattle, brought to these islands by the ships of England; and that the completion of this single benevolent purpose, independent of all other considerations, would sufficiently mark to posterity, that our voyages had not been useless to the general interests of humanity. 'The next morning', says our benevolent commander, 'I planted a pine-apple, and sowed the seeds of melons and other vegetables in Taofa's plantation. I had indeed some encouragement to flatter myself that my endeavours of this kind also would not be fruitless; as I had this day a dish of turnips served up at my dinner, which was the produce of seeds I left here in my former voyage.'

The natives of these islands seldom exceed the common stature; but are very strong and well made, especially as to their limbs. They are generally broad about the shoulders; and though the muscular disposition of the men, which seems a consequence of much action, rather conveys the appearance of strength than of beauty, there are several to be seen who are really handsome. The women are not so much distinguished from the men by their features as by their general form, which is for the most part destitute of that strong fleshy firmness that appears in the latter. Though the features of some are so delicate, as not only to be a true index of their sex, but to lay claim to a considerable share of beauty and expression, for the bodies and limbs of most of the females are well proportioned; and some absolutely perfect models of a beautiful figure. But the most remarkable distinction in the women, is the uncommon smallness and delicacy of their fingers, which may be put in competition with the finest in Europe. The general colour is a cast deeper than the copper brown; but several of the men and women have a true olive complexion; and some of the last are even a great deal fairer. Their countenances, very remarkably express the abundant mildness or good-nature which they possess; and are entirely free from that savage keenness which marks nations in a barbarous state. They are frank, cheerful, and good-natured.

There are, upon the whole, few natural defects or deformities to be found amongst these people. The most common is the tetter or ring-worm, that seems to affect almost one half of them, and leaves whitish serpentine marks every where behind it; but this is of less consequence than another which is very frequent, and appears on every part of the body. Captain Cook had the mortification to learn that all the care he took, when he first visited these islands, to prevent the venereal disease from being communicated to the inhabitants, had proved ineffectual. What is extraordinary, they do not seem to regard it much; and as there appeared few signs of its destroying effects, probably the climate, and the way of living of these people, greatly abate its virulence. There are two other complaints frequent amongst them; one of which is an indolent firm swelling, that affects the legs and arms, and increases them to an extraordinary size in their whole length. The other is a tumor of the same sort in the testicles, which sometimes exceeds the size of the two fists. But in other respects they may be considered as uncommonly healthy.

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Their hair is in general straight, thick, and strong, though a few have it bushy or frizzled. The natural colour is black; but the greatest part of the men, and some of the women, have it stained of a brown or purple colour, and a few of an orange cast. They wear it variously cut. Some have it cut off on one side of the head only; others have it entirely cut off except a single lock; the women in general wear it short. The men have their beards cut short; and both men and women strip the hair from the arm-pits. The men are stained from about the middle of the belly to about half-way down the thighs with a deep blue colour. The women have only a few small lines or spots thus imprinted on the inside of their hands. Their kings, as a mark of distinction, are exempted from this custom.

The men are all circumcised, or rather supercised, as the operation consists in cutting off only a small piece of the foreskin at the upper part; which by that means is rendered incapable ever after of covering the glans. This is all they aim at, as they say the operation is practised from a notion of cleanliness.

The dress of both men and women are the same; and consists of a piece of cloth or matting (but mostly the former) about two yards wide and two and a half long; at least so long as to go once and a half round the waist, to which it is confined by a girdle or cord. It is double before, and hangs down like a petticoat, as low as the middle of the leg. The upper part of the garment above the girdle is plaited into several folds; so that, when unfolded, there is cloth sufficient to draw up and wrap round the shoulders; which is very seldom done. The inferior part are fastened with small pieces; and very often wear nothing but a covering made of leaves of plants, or the maro, which is a narrow piece of cloth or matting like a sash. This they pass between the thighs and wrap round the waist; but the use of it is chiefly confined to the men. The ornaments worn by both sexes are necklaces, made of the fruit of the pandanus, and various sweet-smelling flowers, which go under the general name of *kabulla*. Others are composed of small shells, the wing and leg bones of birds, shark's teeth, and other things; all which hang loose upon the breast; rings of tortoise shells on the fingers; and a number of these joined together as bracelets on the wrists. The lobes of the ears (though most frequently only one) are sometimes perforated with two holes, in which they wear cylindrical bits of ivory about three inches long.

Cleanliness induces them to bathe in the ponds, which seem to serve for no other purpose. They are sensible that salt water hurts their skin; and when necessity obliges them to bathe in the sea, they commonly have some cocoa-nut shells filled with fresh water poured over them to wash it off. People of superior rank use cocoa-nut oil, which improves the appearance of the skin very much.

The employment of the women is of the easy kind, and, for the most part, such as may be executed in the house. The manufacturing their cloth is wholly consigned to their care; as is also that of their mats, which are esteemed both for their texture and their beauty. There are many other articles of less note that employ the spare time of their females; as combs, of which they make vast numbers, and little baskets with small beads;

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but all finished with such neatness and taste in the disposition of the various parts, that a stranger cannot help admiring their assiduity and dexterity.

The province allotted to the men, as might be expected, is far more laborious and extensive than that of the women. Agriculture, architecture, boat-building, fishing, and other things that relate to navigation, are the objects of their care. Cultivated roots and fruits being their principal support, this requires their constant attention to agriculture, which they pursue very diligently, and seem to have brought almost to as great perfection as circumstances will permit. In planting the plantains and yams, they observe so much exactness, that, which ever way you look, the rows present themselves regular and complete. The cocoa-nut and bread fruit trees are scattered about without any order, and seem to give them no trouble after they have attained a certain height.

The houses of the lower people are poor huts, and very small; those of the better sort are larger and more comfortable. The dimensions of one of a middling size are about 30 feet long, 20 broad, and 12 high. Their house is, properly speaking, a thatched roof or shed, supported by posts and rafters, disposed in a very judicious manner. The floor is raised with earth smoothed, and covered with strong thick matting, and kept very clean. A thick strong mat, about two and a half or three feet broad, bent into the form of a semicircle, and set upon its edge, with the ends touching the side of the house, in shape resembling the fender of a fire hearth, incloses a space for the master and mistress of the family to sleep in. The rest of the family sleep upon the floor, wherever they please to lie down; the unmarried men and women apart from each other: Or if the family be large, there are small huts adjoining, to which the servants retire in the night; so that privacy is as much observed here as one could expect. The clothes that they wear in the day serve for their covering in the night. Their whole furniture consists of a bowl or two, in which they make kava; a few gourds; cocoa-nut shells; and some small wooden stools, which serve them for pillows.

They display much ingenuity in the building of their canoes, as well as in the navigating them.

The only tools which they use to construct them, which are very dexterously made, are hatchets, or rather thick adzes, of a smooth black stone that abounds at Toofoa; augres, made of shark's teeth, fixed on small handles, and rasps of a rough skin of a fish, fastened on flat pieces of wood, thinner on one side, which also have handles. The cordage is made from the fibres of the cocoa-nut husk, which, though not more than nine or ten inches long, they plait, about the size of a quill, or less, to any length that they please, and roll it up in balls, from which the larger ropes are made by twisting several of these together. The lines that they fish with are as strong and even as the best cord we make, resembling it almost in every respect. Their other fishing implements are large and small hooks made of pearl-shell. Their weapons are clubs of different sorts (in the ornamenting of which they spend much time), spears, and darts. They have also bows and arrows; but these seemed to be designed only for amusement, such as shooting at birds, and

not for military purposes. The stools are about two feet long, but only four or five inches high, and near four broad, bending downward in the middle, with four strong legs, and circular feet; the whole made of one piece of black or brown wood, neatly polished, and sometimes inlaid with bits of ivory.

Yams, plantains, and cocoa-nuts, compose the greatest part of their vegetable diet. Of their animal food, the chief articles are, hogs, fowls, fish, and all sorts of shell fish; but the lower people eat rats. The two first vegetable articles, with bread-fruit, are what may be called the basis of their food, at different times of the year, with fish and shell-fish; for hogs, fowls, and turtle, seem only to be occasional dainties, reserved for their chiefs. Their food is generally dressed by baking, and they have the art of making, from different kinds of fruit, several dishes which most of us esteemed very good. The generality of them lay their victuals upon the first leaf they meet with, however dirty it may be; but when food is served up to the chiefs, it is commonly laid upon green plantain leaves. The women are not excluded from eating with the men; but there are certain ranks or orders amongst them that can neither eat nor drink together. This distinction begins with the king; but where it ends could not be learnt. They seem to have no set time for meals. They go to bed as soon as it is dark, and rise with the dawn in the morning.

Their private diversions are chiefly singing, dancing, and music, performed by the women. The dancing of the men has a thousand different motions with the hands, to which we are entire strangers; and they are performed with an ease and grace which are not to be described but by those who have seen them.

Whether their marriages be made lasting by any kind of solemn contract, our voyagers could not determine with precision; but it appeared that the bulk of the people satisfied themselves with one wife. The chiefs, however, have commonly several women; tho' it appeared as if one only was looked upon as the mistress of the family.

When any person of consequence dies, his body is washed and decorated by some woman or women, who are appointed on the occasion; and these women are not, by their customs, to touch any food with their hands for many months afterwards; and it is remarkable, that the length of the time they are thus proscribed, is the greater in proportion to the rank of the chief whom they had washed.

The concern of these people for the dead is most extraordinary. They beat their teeth with stones, strike a shark's tooth into the head until the blood flows in streams, and thrust spears into the inner part of the thigh, into their sides below the arm-pits, and through the cheeks into the mouth. All these operations convey an idea of such rigorous discipline, as must require either an uncommon degree of affection, or the grossest superstition to exact. It should be observed, however, that the more painful operations are only practised on account of the death of those most nearly connected.

Their long and general mourning proves, that they consider death as a very great evil. And this is confirmed by a very odd custom which they practise to avert it. They suppose that the Deity will accept

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of the little finger, as a sort of sacrifice efficacious enough to procure the recovery of their health. They cut it off with one of their stone hatchets. There appeared scarcely one in ten of them who was not thus mutilated in one or both hands. According to Captain King, it is common also for the inferior people to cut off a joint of their little finger on account of the sickness of the chiefs to whom they belong.

They seem to have little conception of future punishment. They believe, however, that they are justly punished upon earth; and consequently use every method to render their divinities propitious. The Supreme Author of all things they call *Kallafootonga*; who, they say, is a female residing in the sky, and directing the thunder, wind, rain, and in general all the changes of weather. They believe that when she is angry with them, the productions of the earth are blasted; that many things are destroyed by lightning; and that they themselves are afflicted with sickness and death as well as their hogs and other animals. When this anger abates, they suppose that every thing is restored to its natural order. They also admit a plurality of deities, though all inferior to *Kallafootonga*. They have less absurd sentiments about the immateriality and the immortality of the soul. They call it *life*, the living principle; or, what is more agreeable to their notions of it, *Oiooa*; that is, a divinity or invincible being.

Of the nature of their government no more is known than the general outline. According to the information received, the power of the king is unlimited, and the life and property of the subject are at his disposal; and instances enough were seen to prove that the lower order of people have no property, nor safety for their persons, but at the will of the chiefs to whom they respectively belong. When any one wants to speak with the king or chief, he advances and sits down before him with his legs across; which is a posture to which they are so much accustomed, that any other mode of sitting is disagreeable to them. To speak to the king standing would be accounted here as a striking mark of rudeness.

Though some of the more potent chiefs may vie with the king in point of actual possessions, they fall very short in rank and in certain marks of respect, which the collective body have agreed to pay the monarch. It is a particular privilege annexed to his sovereignty, not to be punctured nor circumcised, as all his subjects are. Whenever he walks out, every one whom he meets must sit down till he has passed. No one is allowed to be over his head; on the contrary all must come under his feet; for there cannot be a greater outward mark of submission than that which is paid to the sovereign and other great people of these islands by their inferiors. The method is this; the person who is to pay obeisance squats down before the chief, and bows the head to the sole of his foot; which, when he sits, is so placed that it cannot easily be come at; and having tapped or touched it with the under and upper side of the fingers of both hands, he rises up and retires. The hands, after this application of them to the chief's feet, are in some cases rendered useless for a time; for, until they be washed, they must not touch any kind of food. When the hands are in this state, they call it *taboo rema*. *Taboo*, in general,

signifies "forbidden," and *rema* is their word for "hand." Their great men are fond of a singular piece of luxury; which is, to have women sit beside them all night, and beat on different parts of their body until they go to sleep; after which they relax a little of their labour, unless they appear likely to awake; in which case they redouble their drumming until they are again fast asleep.

FRIENDSHIP may be defined, a mutual attachment subsisting between two persons; and arising, not merely from the general principle of benevolence, from emotions of gratitude for favours received, from views of interest, nor from instinctive affection or animal passion, but from an opinion entertained by each of them, that the other is adorned with some amiable or respectable qualities.

The object of the general principle of benevolence is *mankind*, not any particular individual. Gratitude regards the person from whom he who feels its emotions has received a favour, whether that person be a virtuous or a vicious, a respectable or a contemptible, character: it prompts the person obliged to make a suitable return to his benefactor, but not to enter into any particular intimacy with him, merely on account of the favours which he has received. Many connections are formed, and dignified with the name of *friendship*, upon no other principle but the sordid hope which one or perhaps each of the parties entertains of accomplishing some selfish purpose through the assistance of the other: but such a connection is so base in its nature, and so transitory in its duration, as to render it unnecessary for us to spend time in demonstrating it to be unworthy of the name of friendship. The instinctive affection which a parent entertains for his child, as well as that which the child feels for his parent, seem intended by nature to form an union between the persons thus related to each other: but the union between parents and children, when supported by no other principle but instinct, is different from friendship; it extends no farther than to cause the parent to provide for his child during his helpless years, and the child to look up to his parent for protection and support. We need not mention that appetite which is the foundation of love, and is the provision which nature has made for the continuation of our species. This appetite alone, and unassisted by some nobler principle, cannot give rise to any connection worthy of an honourable name.

After excluding these principles, we can refer the origin of friendship only to "an opinion entertained by each of the parties between whom it subsists, that the other is adorned with some amiable or respectable qualities." A connection founded on different principles we cannot honour with the name of friendship; but that which flows from this pure source must be noble and virtuous. When two persons of virtue and abilities contemplate each the other's character and conduct, they cannot but view them with complacency and esteem. Habits and actions displaying prudence, fortitude, moderation, integrity, benevolence, and piety, naturally command the approbation of the impartial spectator, and even affect him with delight. But as we are disposed to revisit a landscape the beauties of which we have contemplated with rapture, and read with frequent delight a poem in which genius has

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Friendship. faithfully delineated some of the most enchanting scenes or the most interesting events in nature; so we also become desirous to enjoy frequent opportunities of contemplating a character distinguished for eminent abilities and illustrious virtues. The society of such a person is preferred to his who is disgraced by the opposite qualities. Hence, whenever men of truly respectable characters enjoy opportunities of mutual intercourse, an attachment naturally takes place between them; entirely disinterested, and founded solely on the approbation with which the one cannot avoid regarding the conduct of the other. The esteem which the one is thus induced to entertain for the other will lead them to seek frequent opportunities of enjoying each other's society, mutually to ask and listen to advice, to trust their most secret and important purposes to each other's confidence, and to be no less concerned each of them for the other's interest and honour than for his own. This, and this alone, is genuine friendship; founded on virtue, and on that approbation which virtue never fails to command: it is a natural consequence of intercourse between virtuous men. Where it is once established, it cannot die, while those virtues to which it owes its origin continue to adorn the persons between whom it subsists.

3
Circumstances favourable to the rise and continuance of friendship.

But, perhaps, such a pure and sublime attachment can scarce be expected to exist among beings of so mixed and imperfect a character as mankind. The wise man of the ancient Stoics, or the Christian who faithfully obeys the precepts and follows the steps of his Saviour, might be capable of it; but, unfortunately, humanity never reaches such perfection. Virtue and vice are so blended together in every human character, that while none is so worthless as to excite no other sentiment but abhorrence, there is scarce any so uniformly virtuous as to command unvaried esteem or admiration. Even the purest and most disinterested of those friendships which prevail among men, owe their origin to other meaner principles, as well as to that which has been mentioned as the principle of genuine friendship. There are certain circumstances favourable, and others adverse, to the formation and continuance of friendship. These, making amends, as it were, for the imperfection of human virtue and human knowledge, lead men to overlook each other's faults and follies, and to unite in the bonds of friendship; a friendship which, though less solid, less generous, and less lasting, than that which we have above described, is yet attended with effects favourable to the happiness of individuals, and to the interests of society in general.

Equality of age is favourable to friendship. Infancy, manhood, and old age, differ so considerably from each other in their views, passions, and pursuits, that the *man* will seldom be disposed to associate with the *boy* or the *youth*, in preference to one who has had equal experience in the world with himself; and the *old man* will generally wish for the company of some ancient friend with whom he may speak of "the days of former years."

They who cultivate the *same trade or profession*, enjoy opportunities favourable to the formation of friendship. Being engaged among the same objects, and acquiring skill in the same arts, their knowledge, their sentiments, and habits, are nearly the same: they cannot avoid frequent intercourse with each other; they naturally enter into each other's prejudices and views,

and therefore cannot but take pleasure in each other's **Friendship.** conversation and society. Physicians, lawyers, and divines, form each of them a distinct body; and the members of each of those bodies associate with one another more readily than with men of a different profession. It is related by Swift or Addison, that, in the beginning of the present century, there was a particular coffee-house in London which clergymen used to frequent, and that a son of the church scarce ever ventured to show his head in any other. In the days of Dryden, poets, and all who pretended to poetical genius or taste, resorted to *Will's*, as to another Parnassus, to sip cups of coffee, and now and then perhaps to drink of some more inspiring liquor, instead of the waters of the fountain Hippocrene.

Equality of rank and fortune is also favourable to friendship. Seldom will a man of fortune be able to gain the sincere friendship of any of his dependants. Though he treat them with the most obliging condescension, and load them with favours; yet still, either the sense of dependence, or resentment for imaginary injuries, or impatience of the debt of gratitude, or some other similar reason, will be likely to prevent them from regarding him with cordial affection. Servants are but rarely faithful even to the most indulgent master: Shakespeare's old Adam is a very amiable, but a very uncommon character. Indeed you may as soon expect to find the virtues and the generous courage of the chevalier Bayard among our military men of the present age, as to find an old Adam among the present race of servants. It is no less vain for the poor man to hope to acquire a sincere friend among his superiors in rank and fortune. The superior is generally disposed to exact such profound deference, such gratitude, such respect, even from the inferior whom he admits into his intimacy, that the equal amicable intercourse of friendship can scarce ever take place between them. Among the letters of the younger Pliny, we are pleased to find many monuments of the goodness of his heart. A number of his epistles addressed to friends in meaner circumstances, appear to have been accompanied with very considerable presents, which by his opulence he was well enabled to bestow. But he takes care to let those humble friends know the weight of the obligations which he conferred, and the vastness of the debt of gratitude which they owed to him, in such plain, nay even indelicate terms, that though they might receive his favours with gratitude and regard him as their benefactor, yet they could never regard him as a man with whom they might cultivate the free easy intercourse of friendship. Some one or other of the Greek writers mentions a singular instance of cordial friendship subsisting between two persons in unequal circumstances. One of them dying before the other, and leaving a wife and daughter to whom he had no fortune nor even means of subsistence to bequeath, enjoined his rich friend, in his will, to take the charge of them on himself, and to support them in a liberal manner: nor did he intreat this from his humanity, but demanded it from his friendship. He had made a sure provision for his family. His rich friend delayed not to comply with his dying injunction. He readily took upon himself the charge of the wife and daughter of his deceased friend, treated them with kindness, and at last divided his whole fortune equally

Friendship equally between his own only daughter and the child of his friend. This is an agreeable instance of the power of friendship: but such instances are not to be expected to occur frequently in ordinary life, any more than the stoic virtue of Cato, or the modest piety of a Nelson.

Similarity of taste and temper will generally be found favourable to friendship. Two peevish men, indeed, will not long endure each other's company with much satisfaction; but two persons of mild, humane dispositions will naturally take delight in each other's society and conversation. They who are charmed with the bustle of a gay and active life, avoid the haunts of the indolent and contemplative, and join hand in hand to climb the heights of ambition, or tread the round of amusement and dissipation. Those whom taste leads to cultivate the elegant objects of literature amid the sweets of a rural retirement, to wander thro' the grove, or recline on the brink of some romantic rill, and peruse the pages of one of those geniuses who have shown themselves able to enlighten the understanding, and to kindle the glow of generous sentiment in the breast;—those children of taste frequently associate in their elegant pursuits. We are pleased to read the correspondence of Pliny and Tacitus, of Locke and Molineux, of Swift and Pope. We rejoice to find, that notwithstanding the rivalry of learning and genius, taste and philosophy have a natural tendency to promote benevolence and friendship among their votaries. The bustle of the world must be acknowledged to be generally unfavourable to friendship. When the heart is occupied with the sordid objects of ambition, or avarice, or gay dissipation, there is no room left for the pure and generous sentiments of friendship. Interests often interfere, competitions and jealousies arise, fatal to all the sweets of social intercourse. It is in an active life that virtue shines with the most brilliant lustre; but seldom, alas! does pure virtue appear in the scenes of active life. How beautifully does the character of Atticus shine amid the characters of his illustrious cotemporaries! *ut Luna inter minores ignes!* Sylla, Cæsar, Cicero, Brutus, Antony, and Augustus, were eminent for their abilities and virtues; but being engaged in the bustling pursuits of ambition, they seem to have been strangers to the calm and elegant happiness which Atticus enjoyed. Though those of them who were cotemporaries could not avoid perceiving and admiring each other's merits, yet never did cordial friendship subsist between them. Even Cicero who could so well define the duties and describe the happiness of friendship, yet appears to have but seldom enjoyed its delights. But Atticus, who constantly declined entering the scenes of public life, experienced such happiness in a private condition, as must have been more than an ample reward to him for shunning all the splendid pursuits of ambition. He was the disinterested friend of all those eminent men, and enjoyed their esteem and friendship. So upright was his character, so amiable his manners, that they who were mortal enemies to each other, yet agreed in cultivating at the same time the friendship of Atticus. None of them appear to have hated him on account of his attachment to their enemies: and while he was the friend of Cicero and Octavius, he was at the same time the protector of the wife of Antony. Perhaps

the virtue of such a character may be regarded as problematical. It may be alleged, that while such inveterate dissensions arose among his friends, the neutrality which he preserved was inconsistent with integrity. He has indeed been rashly branded by some writers as an avaricious time-serving man. But no evidence appears to justify their assertions; on the contrary, the most respectable testimony, the nicest scrutiny, exhibit his character in those amiable colours in which we have chosen to view it. Atticus is indeed no ordinary character. The general principles of human nature, and the examples which most frequently occur in the world, naturally suggest a suspicion, that had he been a man of genuine integrity, he must have observed a different tenor of conduct. But there is one circumstance which tends to strengthen considerably the respectable testimony of his cotemporaries in his behalf. In Cato, in Epictetus, in the philosopher who, while suffering under all the violence of an acute distemper, maintained to Pompey that pain was no evil, we have instances of the tenets of philosophy opposing and repressing the principles of nature. We know how often religious enthusiasm has produced the same effects. But Atticus was the votary of the mild and elegant philosophy of Epicurus; which, though there appears to have been a palpable inconsistency between its principles and the superstructure raised upon them, was yet in its general tendency not unfriendly to virtue, and recommended to its votaries that calm and innocent mode of life which Atticus cultivated. There is no small resemblance between the character of Atticus and that of Epicurus, the founder of this philosophy. The same tenets seem to have produced the same effects on both; and we will venture to pronounce so high an encomium on the Epicurean philosophy, as to assert, that it chiefly contributed to form the character of this amiable Roman.

We know not if we may venture to affirm, that friendships are most naturally contracted among persons of the same sex. We believe they often are. If similarity of taste, of sentiments, of manners, be favourable to friendship, this cannot but happen. The distinction which nature has established between the two sexes, the new distinctions which are introduced by the different views with which their education is conducted, and the different duties which they are called to perform in life, have all a tendency to dispose men and women to enter into habits of intimacy with persons of their own sex rather than with the other. Young girls have their peculiar amusements, as boys have theirs: they knit and sew together, consult each other concerning their dress, and associate at their idle hours. Young men, in the same manner, prefer the society of their equals of the same sex till such time as their hearts begin to feel the impulse of a new passion. This soft passion, indeed, causes the youth to prefer the company of his favourite maid to that of his dearest companion; and it perhaps causes the virgin to view her female companions with a jealous eye, while she fears that their charms may win the heart of the youth whose fond regard she herself wishes to engage. But the fears, the jealousies, the timidity, nay even the fondness of love, are incompatible with friendship. Though the lover and his mistress be dear to each other, yet the free confidence of friendship

Friendship. friendship cannot take place between them. They dare not yet venture to trust to each other all the secrets of their hearts. But if their mutual wishes be crowned by marriage; then, indeed, as their interests become the same, if the transports of love are not succeeded by the calm delights and the free confidence of friendship, they must be unhappy. The marriage state is peculiarly favourable to friendship. Persons whose relations to each other are more remote, will often find circumstances concurring to induce them to cultivate a friendly intercourse with each other. But here indifference is almost impossible. It is absolutely requisite, in order that they may not render each other miserable, that the husband and the wife be united in the bonds of friendship. This seems even to be one of the great laws of nature, by means of which provision is made for the happiness and the preservation of society. But though the wife and the husband be particularly attached to each other by the ties of friendship no less than by those of love, yet their mutual affection will not detach them from the rest of the world; their relations to the society around them will still remain; the husband will still cultivate the intimacy of those of his own sex, and the wife will still choose female in preference to male friends. Upon even a superficial view of life, we find reason to declare without hesitation, that acquaintance and intimacy most naturally take place among persons of the same sex. The husband and the wife are more than friends; they are *one bone and one flesh*. It has been sometimes slightly insinuated, and sometimes more openly asserted, by people who have but carelessly viewed the phenomena of social life, or have been disposed to cavil against the fair sex, that women are incapable of sincerity or constancy in friendship with each other. But it seems unnecessary to offer a serious refutation of this cavil. Neither is the general character of the female sex so inferior to that of the male, nor are their circumstances so very different from ours, as to render them totally incapable of those virtues which are necessary to establish and support mutual friendship. They are in general possessed of more exquisite sensibility, nicer delicacy of taste, and a juster sense of propriety, than we: nor are they destitute of generosity, fidelity, and firmness. But such qualities are peculiarly favourable to friendship: they communicate a certain charm to the manners of the person who is adorned with them; they render the heart susceptible of generous disinterested attachment; and they elevate the soul above levity, insincerity, and meanness. Competitions and jealousies must no doubt arise now and then even among the most amiable of the female sex, as well as among us. These will preclude or destroy friendship. But the rivalry of beauty, of dress, of fashion, is not oftener fatal to friendship among the fair sex, than the contests of pride, avarice, vanity, and ambition, among their haughty lords. If friendship be ranked among the virtues, it is not less a female than a male virtue.

5
Relations
of consanguinity.

The delightful intercourse and intimacy of friendship may be naturally expected to subsist not only between the husband and the wife, but among all who are connected by any of the relations of consanguinity. The power of instinct does not always continue to unite the parent and the child. Its offices are of a

temporary nature; but when these are performed, it ceases to operate. During the infancy, the childhood, and even the youth, of his son or daughter, the parent watches over them with fond affection, and labours with anxious assiduity to promote their welfare, for no other reason but because the yearnings of paternal affection draw him towards them. But as they advance farther in life, and become able to care for themselves, it has been so ordered by the wisdom of nature, that the attachment of the parent almost dies away, unless the grateful affection and the merit of his children afford him reason to rejoice over them and bless them. How shocking, how miserable, the condition of that family, whose members are not united by the mutual esteem and confidence of friendship! where the parent views his children with jealousy, shame, indignation, or sorrow; and the children anxiously avoid the society of their parents! Their interests are so nearly connected; they have so many occasions for acting in concert, and must live so long together; that we may almost venture to affirm, that the parent and the child, like the husband and the wife, must be either friends or enemies. But the ties of nature, the influence of habit, sentiments, and circumstances, all concur to form between them the sacred connection of friendship. Brothers and sisters, the children of the same parents, and for a while members of the same family, may be expected to regard each other through life with kindness and esteem; and these we would rather choose to attribute to a rational attachment, founded on certain principles, than to a blind instinctive affection.

These are a few of the distinctions and relations in society which appear most favourable to friendship.—Were we to descend to minuter particulars, we might enumerate all the varieties of taste, of temper, and of circumstances, by which mankind are distinguished from one another, and distributed into particular classes. But this would be too tedious, and does not appear necessary.

As friendship is an attachment which takes place between certain human characters when placed in certain circumstances, there must therefore be laws for supporting the attachment and regulating the intercourse of friendship. Mutual esteem is the basis on which true friendship is established; and the intercourse of friendship ought surely to be connected in such a manner, that this foundation be not injured. Friendship must diminish neither our benevolence nor prudence: it must not seduce us from an honest attention to our private interest, nor contract our social affections.

Sincerity may be considered as the first law of friendship. Artifice and hypocrisy are inimical to all social intercourse. Between the deceitful and the honest, friendship can never subsist. For a while, the one may impose on the other; unsuspicious integrity may not be able to see through the mask under which the hideous features of selfish cunning are veiled; but the deceitful friend must ever be a stranger to the delightful sentiments of genuine friendship. To enjoy these, your virtues must be sincere, your affection for the person whom you call your friend unfeigned: in communicating to each other your sentiments, in offering and listening to mutual advice, in joining to prosecute the same designs, or share in the same amusements, candid

6
Laws of
friendship.

Friendship candid sincerity must still be observed between you. Attempt not to persuade each other, that your mutual affection is more ardent, or your mutual esteem more profound, than it really is. If the sentiments or opinions which the one expresses appear to the other improper or ill founded, let not a false delicacy prevent him from declaring his reasons against them; let him not applaud where, if he were sincere, he must blame. Join not even your friend in an undertaking which you secretly dislike, or an amusement insufferably disagreeable to you. You cannot, consistently with sincerity and candour: and you will soon begin to think the blessings of friendship too dear, when bought at the price of such sacrifices.

But though sincerity is to be faithfully observed in the intercourse of friendship; yet the harshness of contradiction must be carefully avoided. Those obliging manners which are so agreeable in an acquaintance or casual companion, are still more so in a friend. If they are necessary to recommend the advantages of social intercourse in general to the members of society, they are no less necessary to communicate a charm to the intercourse of friendship. People often think themselves intitled to behave to those whom they call their friends, and whose interests they profess to regard as their own, with harshness, negligence, and indiscreet familiarity; but nothing can be more fatal to friendship. It is a well known maxim, established by general and uniform experience, that *too much familiarity occasions mutual contempt*. And indeed how can it be otherwise? Mild obliging manners are understood as the natural and genuine expressions of kindness and affection: boisterous rudeness, petulance, and neglect, are naturally considered as expressive of opposite sentiments. But if friendship assume the tone, the carriage, and the language of enmity or indifference, it must soon lose all its native charms and advantages. Let the friend, as well as the casual companion, when he finds reason to disapprove of the sentiments and conduct, or to dissent from the opinions of his friend, express himself in the gentlest terms, with honesty and sincerity, but without carelessness or harshness. Let no frequency of intercourse nor union of interests ever tempt to careless or contemptuous familiarity. Stiff and unmeaning ceremony may be banished; but ease, and delicacy, and respectful deference, and obliging attention, must supply its room. Much of the unhappiness of the marriage state, and much of the mutual uneasiness which arises among those who are related by the endearing ties of consanguinity, is occasioned by the parties who are thus closely connected, thinking it unnecessary to observe the ordinary rules of good breeding in their mutual intercourse. Even kindness puts on a disgusting garb, and assumes an harsh aspect. But mutual kindness cannot there long subsist. Home, which ought to be a sanctuary to shelter from the anxieties and ills of life, a little paradise where those pure and innocent pleasures might be enjoyed which afford the most genuine happiness, and which are not to be tasted in the bustle of the busy and the dissipation of the gay world;—home thus becomes a place of torment, which is never entered but with pain and unwillingness; and from which the son, the daughter, the husband, and the wife, eagerly seize every opportunity to escape.

Mutual confidence is the very soul of friendship. If *Friendship* friendship be rightly defined to be a mutual affection founded on mutual esteem, those who are united in the bonds of friendship cannot but repose mutual confidence in each other. Am I conscious of none but generous worthy sentiments, and none but upright honest intentions? I readily disclose all the secrets of my soul to him whom I regard as capable only of similar designs and similar sentiments. But it may be asked, how far the confidence of friendship ought to be carried? Must I reveal to my friend all my sentiments, opinions, and designs? Must I communicate to one friend the secrets which have been intrusted to me by another? Or must I rather observe the most suspicious caution in my intercourse with my friends, remembering that he who is now my friend may one day become my enemy? It seems most prudent to observe a medium between suspicious caution and unlimited confidence. Were human virtue perfect, and were there no instances of friends ever becoming enemies, those who regard each other with friendly affection might very reasonably be required to set no bounds to their mutual confidence. But as this is far from being the case, different measures are to be observed. Contract no friendships, if you think it necessary to treat a friend with the same reserve as an enemy. Yet venture not to disclose to your friend all the foolish or evil designs which the wantonness of imagination may seduce you to form. When you feel the emotions of pride, of vanity, or of any evil passion, if you are able to repress them by the strength of reason and conscience, it seems unnecessary for you to tell the struggle, or to boast of the victory. If, at any former period of life, you have been so unfortunate as to commit actions which you cannot now recollect without shame and contrition, there can be no reason why you may not, as far as possible, bury the remembrance of them in your own breast. In short, not to become tedious by descending to minute particulars, the laws of friendship do not require friends to unbosom themselves to each other any farther than is necessary—to give them just ideas of each other's character and temper,—to enable them to be serviceable to each other in the prosecution of honest designs,—and to afford each of them proper opportunities of exciting the other to virtue and wisdom, and of interposing his influence to preserve him from vice and folly. Whatever is necessary for any of these purposes ought to be mutually communicated; whatever is not, may be concealed without violating the laws of friendship. As mutual esteem is the foundation of friendship, and as human friendships are not always lasting, you ought not to pour into the ear of your friend all the impertinences which you may happen to conceive, nor even all the projects which may float in your imagination: but as much of the felicity of friendship arises from the mutual confidence to which it affords room, call not any man your friend in whose presence you find it proper to observe the same suspicious caution as if he were your enemy. The ancients, who talked of friendship with enthusiasm as one of the most elevated among the virtues, required still a closer union and a more disinterested attachment among friends than we dare venture to insist upon. The mutual duties which they have described as incumbent on friends, appear somewhat.

Friendship. what extravagant. Among other things, some of them have gone so far as to require a degree of mutual confidence which would soon destroy all confidence, and could not fail to counteract all the purposes of friendship: they have required one friend to communicate to another, not only all his own thoughts and purposes, but even those secrets which have been confided to his honour by any other friend. But the evil consequences which would result are easily to be foreseen. Perhaps, like Atticus, you enjoy the friendship of men who are mutual enemies; and by communicating the secrets of the one to the other, you will then become the betrayer of both. Or, though not absolutely enemies, yet those who are *your* friends may happen not to be in habits of friendship with each other; and they may then perhaps not scruple to divulge those secrets of one another which you have imprudently blabbed to them. Indeed, might we suppose all mankind absolutely faultless, and not liable to moral imperfection, we need not fear these bad consequences from unbounded confidence in our friends. But friendship would in such a state of society be unknown; just as in the golden age of the poets there are supposed to have been no distinctions of property. We cannot here forbear dropping an observation, which will readily be acknowledged as just by all who have any tolerable knowledge of the morality of the philosophers of ancient Greece. All their doctrines and precepts appear calculated for a different order of beings than mankind. They glanced carelessly at the phenomena of the moral world; and gleaned a few facts, immediately set themselves to erect systems: From these, however wild and theoretical, they then pretended to deduce laws for the regulation of human conduct; and their rules are generally such as might be expected from the means which they appear to have employed in order to arrive at them. An apology has however been offered for some of them, which, in our opinion, could occur only to superficial observers of human life. It has been alleged in behalf of the Stoics, that their system indeed required more exalted virtue than human nature is capable of attaining; but that, notwithstanding this, it could not fail to produce the happiest effects on the manners and sentiments of its votaries. Instances, too, have been produced in support of this assertion; a Cato, an Epictetus, an Antoninus. When we contemplate a model of perfection beyond what we can hope to reach, say the advocates of the Stoic philosophy, though we despair of attaining, yet we are prompted to aspire after it. Now, the most natural way of reasoning here seems to lead to a very different conclusion. If an object is set before me which I must not hope to obtain, I am unwilling to waste my time and exhaust my vigour in the pursuit of it: bid me ascend an inaccessible height, I view the vale below with new fondness. Philosophy, as well as superstition and enthusiasm, might in a few instances triumph over the principles of nature; but was it always equally powerful? Were all the disciples of Zeno Catos or Epictetuses? Have all the monks and anchorites of the Romish church been holy as the founders of their orders? No: the Greek philosophers who infested Rome, and taught those *whimsical* doctrines which we hear frequently dignified with the name of *sublime*, were singularly corrupted and licentious in their manners.

Friendship. If those of the *regular* clergy of the church of Rome have been always more pure, they have been cruelly calumniated. Ask, then, only what I am capable of performing: if you demand what is above my strength, I sit still in indolence. In its general tendency, the Stoic philosophy was favourable rather to vice than to virtue.

But we have not yet exhausted all the duties of friendship. We have inculcated sincerity, and mutual respect and obligingness of manners; we have also endeavoured to ascertain, what degree of mutual confidence ought to take place between friends. But an important question still remains to be considered: how far is an *union of interests* to take place between friends? Am I to study the interest of my friend in preference to my own? May I lawfully injure others, in order to serve him? Here, too, we must consider the circumstances and the strength of human nature; and let us beware of imposing burdens too heavy to be borne. The greater and more perfect the union which reigns in society, the greater will be its strength and happiness; the closer the union of friends, the more advantages will each of them derive from their union. Where other ties besides those of friendship concur to unite two individuals, their interests will be more closely conjoined than if they were connected by the ties of friendship alone. The order of nature seems here to be,—the husband and wife—the parent and child—brothers and sisters, the offspring of the same parents—friends, connected by the ties of friendship alone. And, if we may presume to guess at the intentions of the Author of nature from what we behold in his works and read in his word, the closest union in society ought to be that between the husband and the wife; their interests are altogether the same; they ought mutually to forego convenience and gratification for each other's sake. The interests of parents and children are somewhat less closely connected; much is due from the one to the other, but somewhat less than in the former relation; their interests may sometimes be separate, but never ought to be opposite. Next come brethren, and other more distant relations; and next, the friend. In these cases, where we suppose the attachment of friendship to operate together with the ties of nature, we perceive that interests are variously united, and various duties are due; scarce in any of them does it appear that the interests of two can become entirely one. Still less can that be expected to happen, where the ties of friendship act not in concert with those of nature. We give up, therefore, all those romantic notions, which some have so earnestly insisted on, of requiring the friend to consider his friend as himself. We cannot expect any two individuals to possess precisely the same degree of knowledge, to entertain exactly the same sentiments, or to stand in circumstances precisely similar. But till this happen, the interests of two can never be precisely the same. And we will not, therefore, require the friend actually to prefer his friend to himself; nay, we will even allow him to prefer himself to his friend; convinced that such is the design of nature, and that by presuming to counteract the principles of nature we shall be able to serve no useful purpose. But as far as the first principles of human action and the institutions of society permit, we may reasonably require of friends, that they mutually endeavour

Friendship. your to contribute each to the other's interest. You will not desert your own family, nor neglect what is absolutely necessary for your own preservation, in order that you may serve a friend. It is not requisite that you be either a Damon or a Pythias. Away with what is romantic; but scruple not to submit to what is natural and reasonable. When your friend needs your direction and advice, freely and honestly give it: does he need more than advice; your active exertions in his behalf? the laws of friendship require you not to refuse them. Is it necessary for him to receive still more substantial assistance? You may even be expected to aid him with your fortune. But remember, that even the amiable principle of benevolence must be subject to the directions of prudence: if incapable of taking care of ourselves, we cannot be expected to contribute to the good of others: society would not be favourable to the happiness of the human race, if every individual studied the general interest so far as to neglect his own. We are not born to be citizens of the world; but Europeans, Britons, Englishmen or Scotchmen. Let every one, then, seek the interest and happiness of his friends with whom he is connected by the laws of friendship alone, in subordination to his own particular interest and happiness, and to the interest and happiness of those with whom he is connected by the ties of nature and the general institutions of society. Engage not in the service of your friend, nor lavish your fortune in his behalf, if by that means you are likely to injure either yourself or your family. Still less will you think it requisite to carry your friendship to such romantic excesses as to commit crimes in the service of your friend. The ancients, whose ideas of the nature and duties of friendship were romantic and extravagant, have, some of them, required that a friend should hesitate at no action, however atrociously wicked, by which he can be useful to his friend. Have I been guilty of theft or murder, or any other heinous violation of the laws of morality or the institutions of society: when I am brought to justice for my crime, if you, being my friend, are appointed to sit as my judge, the laws of friendship, say those admirable masters of morality, require that you pronounce me innocent, though convinced of my guilt. But we need not declaim against the absurdity of enjoining such base deeds as duties of friendship. The idea of a connection, the laws of which are inimical to the order of society, must strike with horror every person who thinks of it. Such a connection is the union of a knot of villains, conspiring against the peace, nay even the existence of society.

General view of the advantages of friendship. Such we apprehend to be the nature of rational friendship; such the circumstances in the order of nature and of society which are most favourable to this union; and such the duties, by the performance of which it may be maintained. When founded on these principles, and regulated by these laws, friendship is truly virtuous, and cannot but be highly beneficial to the individuals between whom it subsists, and to the interest of society in general. How delightful to have some person of an amiable and virtuous character in whom you can confide; who will join with you in the prosecution of virtuous designs, or will be ready to call you back when you heedlessly stray into the paths of vice and folly! who will administer to you honest,

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upright advice; will rejoice in your prosperity, will glory over your virtues, and will be ready to console and relieve you when sinking under the pressure of distress! Must not your connection with such a person be favourable to your virtue, your interest, and your happiness? When we survey any sublime or beautiful scene in nature, we wish for some person of congenial taste and feelings to participate with us in the noble enjoyment which the prospect affords; when we read any fine piece of composition, the pleasure which we receive from it is more exquisite if others join with us in applauding it. The landscape which we have often surveyed, the poem which we have often read, please us anew, with all the charms of novelty, when we have an opportunity of pointing out their beauties to some person to whom they have been hitherto unknown. Friendship communicates new charms and a more delicate relish to all our most refined and elegant pleasures. It enlivens our joys, it soothes and alleviates our sorrows. What Cicero has said of polite letters and philosophy, may be with still stronger propriety said of friendship. In every condition of life the influence of virtuous friendship is favourable to our welfare and our happiness: in prosperity, in adversity; in the silence and tranquillity of retirement, as well as amid the hurry of business; in the bosom of your family, and when surrounded by your nearest connections, no less than when removed to a strange country. Indeed, whatever advantages society bestows above what are to be enjoyed in a savage state, not less numerous nor less important are those which we may derive from uniting in the bonds of friendship, rather than living in a state of enmity or indifference.

But though friendship, when founded on mutual esteem, and regulated by the laws of prudence, benevolence, and honesty, be productive of so many happy effects; yet many instances occur in the world, in which connections dignified with the name of friendship are unfavourable both to the virtue and the happiness of those between whom they subsist. When men associate from views of convenience; when their union is hastily formed without a knowledge of each other's temper and character; when they are drawn together by accident, as when they happen to agree in the pursuits of the same interests or pleasures; when the young and the gay resort together to the haunts of dissipation, and the covetous and ambitious find it convenient to toil in concert for riches and power: on all such occasions, the connection which is formed and dignified with the name of friendship is unworthy of that honourable appellation. It is not virtuous; it is productive of no happy effects, and is quickly dissolved. He, therefore, who is not incapable of virtuous friendship, and is desirous of enjoying its advantages, must carefully consider the nature of the connection which he wishes to form, gain a thorough acquaintance with the character of the person whose esteem and affection he wishes to acquire, and attend to those rules by the observance of which true friendship may be maintained.

Many instances are related, which show what power it is possible for friendship to acquire over the human heart. We need not here repeat the well-known story of Damon and Pythias, whose generous friendship afforded a spectacle which softened even the savage heart.

Friendship. of Dionysius. It is known to every school-boy; and, after the affected narrative of Valerius Maximus, has been studiously detailed and commented on by almost every succeeding story-teller or moralist. Addison, in one of his *Spectators*, gives a beautiful little relation, we know not upon what authority, which finely illustrates the power both of friendship and love. Two male negroes, in one of our West India islands, nearly of the same age, and eminent among their fellows in slavery for gracefulness of figure, strength, agility, and dexterity, were also distinguished for their mutual friendship and for their common attachment to a young female negro, who was generally esteemed the most beautiful of her complexion in the whole island. The young female appeared to be equally pleased with both her lovers; and was willing to accept either of them for a husband, provided they could agree between themselves which of them should yield to the pretensions of the other. But here lay the difficulty; for while neither would treacherously supplant, neither of them was willing to yield to his friend. The two youths, therefore, long suffered the severest affliction, while their hearts were torn between love and friendship. At length, when they were no longer able to endure the agony of such a contest, being still unable to repress their passion for their lovely countrywoman, and incapable of violating the laws of friendship,—on a certain day, they both, in company with the object of their ill-fated love, retired into a wood adjoining to the scene of their labours. There, after fondly embracing the maid, calling her by a thousand endearing names, and lamenting their own unhappy fate, they stabbed a knife into her breast; which, while still reeking with her blood, was by each of them in his turn plunged into his own. Her cries reached the people who were at work in the next field: some of them hastening to the spot, found her expiring, and the two youths already dead beside her.

We have introduced this little narrative as a striking instance of the noble effects which naturally result from genuine friendship. Here we see it superior to the force of the most violent of passions. Had the elevated souls of those negro youths been refined and enlightened by culture and education in the principles of morality and true religion, we may reasonably suppose that their friendship would have triumphed over their love, without prompting them to the rash and desperate deed which they committed.

10
Friendship
not inconsistent with
the spirit of
Christianity.

Friendship, thus amiable in its character, thus beneficial in its influence and effects, the theme of unbounded panegyric to the philosophers and moralists of every age, has been said by some respectable modern writers to be inconsistent with the spirit of that holy religion which we profess, and which we regard as the revelation of heaven. General benevolence is frequently inculcated through the gospel: Jesus often earnestly intreated his disciples, “to love one another;” and directed them in what manner to display their mutual love, by telling them, that “whatsoever things they could reasonably wish to receive from others, the same ought they to do them.” The writers of the epistles often enlarge on the topics of charity and brotherly love. But private friendship is no where recommended in the code of Christianity. Nay, it is so inconsistent with that universal benevolence which

Friendship. the gospel enjoins; that where the one is recommended and enforced, the other may be understood to be tacitly forbidden. But can that religion be true, or can it be favourable to the happiness of its votaries, which is inimical, nay, which is even not friendly to virtuous friendship? Such are the suggestions of Lord Shaftesbury and Soame Jenyns on this head.

We must grant them, that the system of morals or religion which discourages a connection so noble in its origin, so amiable in its character, and so beneficial in its influence, as virtuous friendship, is rather unfavourable to the happiness and virtue of its votaries. But we must consider the genius of Christianity with more careful attention, before we suffer ourselves to be persuaded that friendship is inconsistent with it. Universal benevolence is, indeed, inculcated in the gospel: we are required to love our neighbours as ourselves: and our Saviour seems to insinuate, in the story of the humane Samaritan, that we ought to regard as neighbours all our brethren of the human race, however separated from us by any of the distinctions of society. But it would be unfair to conclude from this, that the great Author of the gospel meant to abolish the order of social life, or to oppose the ties of nature. These may still be respected, though the laws of this benevolence be obeyed. The parent is not required to desert his child, in order that he may assist or relieve his neighbour; nor the child to leave his parent to perish under the infirmities of old age, while he hastens to lend assistance to a stranger. The gospel was not intended to dissolve communities, or to abrogate the distinctions of rank. In Jesus the end of the ceremonial law was accomplished: by him, therefore, that burden of types and ceremonies with which the Jews had been loaded was taken away. But he who abolished the ceremonial law declared, that the obligations of the moral law should be more permanent than heaven or earth: The duties which it enjoined were still to be religiously discharged: The precepts of the gospel were to illustrate and enforce, not to contradict, the institutions of the moral law. The relative duties of parents and children were still to be performed; though men were directed not to confine all their sentiments of benevolence to domestic relations. Jesus, in his conduct, did not set himself to oppose the order of society. In various parts of the New Testament all the social duties are defined and enforced; the mutual duties of parents and children, of husbands and wives, and of masters and servants. The submission of all the members of a community to that power which is vested with the authority of the whole, is also strictly enjoined in the gospel. Jesus, when in his last moments he recommended his mother to the protection of his beloved disciple, chose to ask *him* to consider *her* as a parent; and directed *her* to expect from *him* the respect and kindness of a son. These facts and observations teach us in what sense to understand that universal benevolence which is inculcated in the gospel. Though we are to love all mankind; yet it is not necessary that all the individuals of the human race share our affection alike. Were we powerful, and wise, and benevolent, as the Deity; such extensive benevolence might be required of us: But our sphere of action and observation is narrow; we cannot extend our acquaintance or influence beyond a very limited circle. Were we to en-

Friendship deavour to be equally useful to all mankind, we should become incapable of being useful to any individual. We cannot become citizens of the world in the sense in which some philosophers have affected to call themselves such, without becoming outcasts from every particular society. A son, a brother, a countryman, a stranger, lie around you, each in circumstances of extreme distress; you pity their misfortunes, and would gladly administer relief: but such is your benevolence, that you feel precisely the same degree of compassion for each of them; you cannot determine to whom you should first stretch out an helping hand; and you therefore stand like that venerable ass of the schoolmen, whose tantalizing situation between two bundles of hay has been so long celebrated and lamented by metaphysicians; and suffer son, and brother, and countryman, and stranger, to perish, without relieving any of them by your kind offices. It is therefore the design of the gospel, that we should submit to the laws of nature, and comply with the institutions of society. First, attend to self-preservation; next, perform the duties of a wife or husband,—a parent,—a child,—a brother,—a citizen,—an individual of the human race. You will do well, indeed, to regard all mankind with benevolence; but your benevolence will be unavailing to the objects of it, if you overlook the distinctions of nature and those institutions which support the union of social life.

But if the spirit of Christianity be not inimical to the institutions and relations of society, neither can it be unfavourable to friendship. If that benevolence which the gospel enjoins, admit of any modifications, why not of that particular modification which constitutes private friendship? It is not, indeed, directly enjoined; but neither is it forbidden. It is perfectly consistent with the general tendency and spirit of the gospel system: being favourable to the interests of society, it cannot but be agreeable to our holy religion.

But it is recommended by no direct precept, say those who would represent Christianity as inimical to it; while it has been the favourite theme of the philosophers and moralists of the heathen world.

But why should friendship be recommended by means different from those which the gospel employs for the purpose? Make yourself well acquainted with that admirable system which you so earnestly oppose; you will find that even the duties of private friendship are better explained and more powerfully enforced in the gospel, than by all the heathen philosophers and poets from Hesiod to Plutarch. The gospel makes a distinction between the virtuous and the vicious; it represents one character as more amiable and respectable than another. As it distinguishes between virtue and vice, between piety and impiety; so its great object is to deter us from vice, and to encourage us to the practice of virtue. It cannot be supposed, then, that the gospel will direct us to associate indifferently with virtuous and profligate characters. It does not. It directs us to seek improvement, by associating with those whom we have reason to esteem. It directs those who are incorrigibly wicked to be expelled from society. What is this but to command us to enter into habits of intimacy wherever there is ground for mutual esteem? But this is the only basis of genuine friendship. When all the means which lead to a certain

end are laid before you, and when you are particularly directed by some high authority to employ those means; though the end which you thus attain be not pointed out, yet the commanding you to employ such a series of means, is evidently the same as if you were directed to accomplish the purpose to which they tend. Thus, though the precepts of Christianity do not directly enjoin private friendship; yet they have a direct tendency to form those exalted characters who alone are capable of true friendship; they inculcate those virtues which naturally give rise to this generous attachment, and are absolutely necessary to support it where it is formed; they inculcate benevolence by the most effectual motives, and admit of modifications of that benevolence, correspondent to the relations and institutions of society: And therefore they may be considered in as strong and direct terms, as if it had been expressly said, "Cultivate private friendship." Besides, friendship is rather an *accident* of society, a natural consequence of our character as moral and social beings, than a relation to be regulated and defined by institutions.

This union, so natural between virtuous persons, has been countenanced by the example of the Author of our religion; to whose life, no less than to his doctrines and precepts, we will do well to look for a standard by which we may regulate our conduct. We allude to two remarkable instances which occur in the evangelical history; and with the recital of which, as stated in all their striking circumstances by a very elegant writer *, we shall conclude the present article. * W. Melmoth, Esq;

"The evangelist, in relating the miracle which Christ performed at Bethany by restoring a person to life who had lain some days in the grave, introduces his narrative by emphatically observing, that 'Jesus loved Lazarus;' intimating, it should seem, that the sentiments which Christ entertained of Lazarus were a distinct and peculiar species of that general benevolence with which he was actuated towards all mankind. Agreeably to this explication of the sacred historian's meaning, when the sisters of Lazarus sent to acquaint Jesus with the state in which their brother lay, they did not even mention his name; but, pointing him out by a more honourable and equally notorious designation, the terms of their message were, 'Behold! he whom thou lovest is sick!' Accordingly, when he informs his disciples of the notice he had thus received, his expression is, 'Our friend Lazarus sleepeth.' Now that Christ did not upon this occasion use the word *friend* in its loose undistinguished acceptance, but in a restrained and strictly appropriated sense, is not only manifest from this plain account of the fact itself, but appears farther evident from the sequel. For as he was advancing to the grave, accompanied with the relations of the deceased, he discovered the same emotions of grief as swelled the bosoms of those with whom Lazarus had been most intimately connected; and sympathizing with their common sorrow, he melted into tears. This circumstance was too remarkable to escape particular observation: and it drew from the spectators, what one should think it must necessarily draw from every reader, this natural and obvious reflection, 'Behold! how he loved him!'

"But in the concluding catastrophe of our Saviour's life, he gave a still more decisive proof that sentiments

Friendship,
Friesland.

of the strongest personal attachment and friendship were not unworthy of being admitted into his sacred bosom: they were too deeply, indeed, impressed, to be extinguished even by the most excruciating torments. In those dreadful moments, observing among the afflicted witnesses of his painful and ignominious sufferings, that faithful follower who is described by the historian as 'the disciple whom he loved;' he distinguished him by the most convincing instance of superior confidence, esteem, and affection, that ever was exhibited to the admiration of mankind. For, under circumstances of the most agonizing torments, when it might be thought impossible for human nature to retain any other sensibility but that of its own inexpressible sufferings, he recommended to the care and protection of this his tried and approved friend, in terms of peculiar regard and endearment, the most tender and sacred object of his private affections. But no language can represent this pathetic and affecting scene with a force and energy equal to the sublime simplicity of the Evangelist's own narrative: 'Now there stood by the cross of Jesus, his mother and his mother's sister, and Mary Magdalene. When Jesus saw his mother and the disciple (standing) by, whom he loved; he saith to his mother, Behold thy son! then he saith to the disciple, Behold thy mother! And from that hour that disciple took her to his own home.'

"It may safely be asserted, that among all those memorable examples of friendship, which have been celebrated with the highest encomiums by the ancients, there cannot be produced a single instance in which the most distinguishing features of exalted amity are so strongly displayed as in the foregoing relation. The only one, perhaps, that bears even a faint similitude to it, is that famous transaction † recorded by a Greek author, which passed between Eudamidas and Aretheus. But when the very different circumstances attending the respective examples are duly considered, it must be acknowledged, that the former rises as much above the latter in the proof it exhibits of sublime friendship, as it does in the dignity of the characters concerned.

"Upon the whole, then, it appears, that the divine Founder of the Christian religion, as well by his own example as by the spirit of his moral doctrine, has not only encouraged but consecrated friendship."

FRIESLAND, one of the united provinces of the Low Countries. It is bounded on the east by the river Lauwers, which parts it from the lordship of Groningen, on the south by Overijssel, on the west by the Zuider-Zee, and on the north by the German ocean. It is 30 miles from north to south, and 28 from east to west. The land is very fertile in corn and pasture; the horses are large, and the cows and sheep prolific. It is divided into three parts; Westergo to the west, Oostergo to the east, and Sevenwalden to the south. The islands of Sheling, Ameland, and other small ones, are dependent on this province. The principal towns are Leuwarden the capital, Franeker, Dokkum, Harlingen, and Staveren.

FRIESLAND (East), a province of Germany, in the circle of Westphalia, lying near the German ocean. It is bounded on the south by the bishopric of Munster, on the east by the county of Oldenburg, on the west by the province of Groningen, and on the north by

the sea, being about 50 miles in length, and 30 in breadth. It belongs to Prussia, and was formerly called the county of *Embsen*. It is a very fertile country, and feeds a great number of cattle; but it was greatly damaged by an inundation in 1717, and the repair of the dykes cost an immense sum. The principal towns are Norden, Leer, Eßens, Whitmunde, and Aurick. *Embsen* was an imperial city, and the principal place in the country; but now belongs also to the king of Prussia, who bought it of the Dutch.

FRIGATE, in sea-affairs, a ship of war, usually of two decks, light built, designed for swift sailing. When it hath but one deck; and consequently is of a smaller size, they call her a light frigate.

Frigates mount from 20 to 44 guns, and are esteemed excellent cruisers. The name was formerly known only in the Mediterranean, and applied to a long kind of vessel navigated in that sea with sails and oars. The English were the first who appeared on the ocean with these ships, and equipped them for war as well as for commerce.

FRIGATE-Built, denotes the disposition of the decks of such merchant ships as have a descent of four or five steps from the quarter-deck and fore-castle into the waist, in contradistinction to those whose decks are on a continued line for the whole length of the ship, which are called *galley-built*.

FRIGATOON, a Venetian vessel, commonly used in the Adriatic, built with a square stern, and without any fore-mast, having only a main-mast, mizen-mast, and bow-sprit.

FRIGHT, or TERROR, a sudden and violent degree of fear. See FEAR.

Sudden fear is frequently productive of very remarkable effects upon the human system. Of this many instances occur in medical writings.—In general, the effects of terror are a contraction of the small vessels and a repulsion of the blood in the large and internal ones; hence proceed a suppression of perspiration, a general oppression, trembling, and anguish of the heart, and lungs overcharged with blood.

Frights often occasion incurable diseases, as epilepsy, stupor, madness, &c. In acute diseases, they have evidently killed many, by the agitation into which they have thrown the spirits, already too much disordered. We have also accounts of persons absolutely killed by terrors when in perfect health at the time of receiving the shock from them: people ordered to be executed, but with private orders for a reprieve, have expired at the block without a wound.—Out of many instances of the fatal effects of fear recorded in writers, the following is selected as one of the most singular. "George Grochantzy, a Poland, who had enlisted as a soldier in the service of the king of Prussia, deserted during the last war. A small party was sent in pursuit of him; and when he least expected it, they surprised him singing and dancing among a company of peasants, who were got together in an inn and were making merry. This event, so sudden and unforeseen, and at the same time so dreadful in its consequences, struck him in such a manner, that, giving a great cry, he became at once altogether stupid and insensible, and was seized without the least resistance. They carried him away to Glocan, where he was brought before the council of war, and received sentence as

† Already
recited in
this article,
p. 468, col. 2.

Frigate
Fright.

Fright.

a deserter. He suffered himself to be led and disposed of at the will of those about him, without uttering a word, or giving the least sign that he knew what had happened or would happen to him. He remained immovable as a statue wherever he was placed, and was wholly passive with respect to all that was done to him or about him. During all the time that he was in custody, he neither eat, nor drank, nor slept, nor had any evacuation. Some of his comrades were sent to see him; after that he was visited by some officers of his corps and by some priests; but he still continued in the same state, without discovering the least signs of sensibility. Promises, intreaties, and threatenings, were equally ineffectual. The physicians who were consulted upon his case were of opinion, that he was in a state of hopeless idiocy. It was at first suspected, that those appearances were feigned; but these suspicions necessarily gave way, when it was known that he took no sustenance, and that the involuntary functions of nature were in great measure suspended. After some time they knocked off his fetters, and left him at liberty to go whither he would. He received his liberty with the same insensibility that he had showed upon other occasions: he remained fixed and immovable; his eyes turned wildly here and there without taking cognizance of any object, and the muscles of his face were fallen and fixed like those of a dead body. Being left to himself, he passed 20 days in this condition, without eating, drinking, or any evacuation, and died on the 20th day. He had been sometimes heard to fetch deep sighs; and once he rushed with great violence on a soldier, who had a mug of liquor in his hand, forced the mug from him, and having drank the liquor with great eagerness, let the mug drop to the ground."

When a person is affected with terror, the principal endeavour should be to restore the circulation to its due order, to promote perspiration, and to allay the agitation of the patient. For these purposes he may drink a little warm liquor, as camomile-tea, &c. the feet and legs may be put into warm water, the legs rubbed, and the camomile-tea repeated every six or eight minutes; and when the skin is warm, and there is a tendency to perspiration, sleep may be promoted by a gentle opiate.

But frights have been known not only to cause, but also to cure, diseases. Mr Boyle* mentions agues, gout, and sciatica, cured by this means.

To turn from the serious to the ludicrous effects of fear, the following instance of the latter sort, quoted from a French author by Mr Andrews in his volume of Anecdotes, shows upon what slight occasions this passion may be sometimes excited in a very high degree, even in persons the most unlikely to entertain such a guest. "Charles Gustavus (the successor of Christina of Sweden) was besieging Prague, when a boor of most extraordinary visage desired admittance to his tent; and being allowed entrance, offered, by way of amusing the king, to devour a whole hog of one hundred weight in his presence. The old general Konigsmarc, who stood by the king's side, and who, soldier as he was, had not got rid of the prejudices of his childhood, hinted to his royal master that the peasant ought to be burnt as a forcerer. 'Sir,' said the fellow, irritated at the remark, 'if

your majesty will but make that old gentleman take off his sword and his spurs, I will eat him immediately before I begin the hog.' General Konigsmarc (who had, at the head of a body of Swedes, performed wonders against the Austrians, and who was looked upon as one of the bravest men of the age) could not stand this proposal, especially as it was accompanied by a most hideous and preternatural expansion of the frightful peasant's jaws. Without uttering a word, the veteran suddenly turned round, ran out of the court, and thought not himself safe until he had arrived at his quarters; where he remained above 24 hours locked up securely, before he had got rid of the panic which had so severely affected him."

Fear (Dr Beattie† observes) should not rise higher than to make us attentive and cautious; when it gains an ascendancy in the mind, it becomes an insupportable tyranny, and renders life a burden. The object of fear is evil; and to be exempt from fear, or at least not enslaved to it, gives dignity to our nature, and invigorates all our faculties. Yet there are evils which we ought to fear. Those that arise from ourselves, or which it is in our power to prevent, it would be madness to despise, and audacity not to guard against. External evils, which we cannot prevent, or could not avoid without a breach of duty, it is manly and honourable to bear with fortitude. Insensibility to danger is not fortitude, no more than the incapacity of feeling pain can be called patience; and to expose ourselves unnecessarily to evil is worse than folly, and very blameable presumption. It is commonly called fool-hardiness; that is, such a degree of hardness or boldness as none but fools are capable of. See the article **FORTITUDE**.

FRIGID (*frigidus*), in a general sense, denotes the quality of being cold. It is frequently applied to a jejune style, that is unanimated by any ornaments, and consequently without any force or vigour.

FRIGID Zone. See **ZONE**.

FRIGIDITY, in medicine, the same with **IMPOTENCE**.

FRIGORIFIC, in physiology, small particles of matter, which, according to Gassendus and others, being actually and essentially cold, and penetrating other bodies, produce in them that quality which we call cold. See **COLD**.

FRILAZIN, the name of a class or rank of people among the Anglo-Saxons, consisting of those who had been slaves, but had either purchased, or by some other means obtained, their liberty. Though these were in reality free men, they were not considered as of the same rank and dignity with those who had been born free, but were still in a more ignoble and dependent condition, either on their former masters or on some new patrons. This custom the Anglo-Saxons seem to have derived from their ancestors in Germany, among whom those who had been made free did not differ much in point of dignity or importance in the state from those who continued in servitude. This distinction between those who have been made free and those who enjoy freedom by descent from a long race of free men, still prevails in many parts of Germany; and particularly in the original seats of the Anglo-Saxons. Many of the inhabitants of towns and cities in England, in this period, seem to have been of this class of men,

Fright

Frilazin.

† Elements of Moral Science.

* Works, Abr. p. 82, &c.

Frill,
Fringilla.

who were in a kind of middle state between slaves and freemen.

FRILL, in falconry. When a hawk trembles or shivers, they say she frills.

Plate CCI.

FRINGILLA, in ornithology, a genus belonging to the order of passer. The bill is conical, straight, and sharp-pointed. There are no less than 108 species comprehended under this genus, distinguished principally by varieties in their colour. The following are the most noted.

1. The *carduelis*, or GOLDFINCH, with the quill-feathers red forwards, and the outermost without any spots; the two outermost are white in the middle, as the rest are at the point. The young bird before it moults is grey on the head; and hence it is termed by the bird-catchers a *grey-pate*. There is a variety of goldfinches called by the London bird-catchers a *cheverel*, from the manner in which it concludes its jerk. It is distinguished from the common sort by a white streak, or by two, sometimes three, white spots under the throat. Their note is very sweet; and they are much esteemed on that account, as well as for their great docility. Towards winter, they assemble in flocks; and feed on seeds of different kinds, particularly those of the thistle. It is fond of orchards, and frequently builds in an apple or pear-tree: its nest is very elegantly formed of fine moss, liverworts, and bents, on the outside; lined first with wool and hair, and then with the gossin or cotton of the fallow. It lays five white eggs, marked with deep purple spots on the upper end; and has two broods in the year. When kept in cages, they are commonly fed much on hemp-seed, which they eat freely, but which is said to make them grow black, and lose both their red and yellow. The goldfinch is a long-lived bird, often attaining the age of 20 years.—This species is plenty throughout Europe; it is also met with both in Asia and Africa, but less common.

2. The *caelebs*, or CHAFFINCH, hath black limbs, and the wings white on both sides; the three first feathers of the tail are without spots, but two of the chief are obliquely spotted. It has its name from its delighting in chaff. This species entertains us agreeably with its song very early in the year, but towards the latter end of summer assumes a chirping note: both sexes continue with us the whole year. What is very singular in Sweden, the females quit that country in September, migrating in flocks into Holland, leaving their mates behind: in the spring they return. In Hampshire Mr White has observed something of this kind; vast flocks of females with scarcely any males among them. Their nest is almost as elegantly constructed as that of the goldfinch, and of much the same materials, only the inside has the addition of some large feathers. They lay four or five eggs of a dull white colour, tinged and spotted with deep purple. They are caught in plenty in flight-time; but their nests are rarely found, though they build in hedges and trees of all sorts. They make their nests of moss and wool, or any thing they can gather up; and have young ones thrice a-year. They are seldom bred from the nest, as being a bird not apt to learn another's song, nor to whistle; so that it is best to leave the old ones to bring them up. The Essex finches are generally allowed to be the best sort, both for length of

song and variety, ending with several notes that are very pretty. It is an hardy bird, and will live almost upon any seeds, none coming amiss to him. He is seldom subject to disease, but will be very lousy if not sprinkled with wine two or three times a-month.

3. The *montifringilla*, or BRAMBLING, has a yellow bill tipped with black; the head, hind part of the neck, and back, are black; the throat, fore part of the neck, and breast, pale rufous orange; lower part of the breast and belly white; the quill feathers brown, with yellowish edges; the tail a little forked; the legs grey. This species migrates into England at certain seasons, but does not build here. It is frequently found among chaffinches, and sometimes comes in vast flocks. They are also seen at certain times in vast clouds in France, inasmuch that the ground has been quite covered with their dung, and more than 600 dozen were killed each night. They are said to be particularly fond of beech mast, but will also eat seeds of various other kinds. Their flesh is eaten by many, but is apt to prove bitter. They are said to breed about Luxemburg, making the nest on the tall fir-trees, composed of long moss without, and lined with wool and feathers within: the eggs are four or five in number, yellowish, and spotted; and the young are fledged at the end of May. This species is found more or less throughout Europe; and is common in the pine forests of Russia and Siberia, but those of the last are darker in colour and less in size.

4. The *domestica*, or SPARROW, hath the prime feathers of the wings and tail brown, the body variegated with grey and black, and a single white streak on the wings. These well-known birds are proverbially facacious, and have three broods in a year. They are every where common about our houses, where they build in every place they can find admittance; under the roof, corner of the brick-work, or in holes of the wall. They make a slovenly nest; generally a little hay ill put together, but lined well with feathers; where they lay five or six eggs of a reddish white colour spotted with brown. They will sometimes build in the neighbouring trees, in which case they take more pains with the nest: and not unfrequently they expel the martins from theirs, to save the trouble of constructing one of their own. The sparrow, from frequenting only habitations and parts adjacent, may be said to be chiefly fed from human industry; for in spite of every precaution, it will partake with the pigeons, poultry, &c. in the food thrown out to them, grain of all kinds being most agreeable to its taste; though it will eat refuse from the kitchen of most kinds. It is a familiar but crafty bird, and will not so easily come into a snare as many others. In autumn they often collect into flocks, and roost in numbers on the neighbouring trees, when they may be shot by dozens, or of night caught in great numbers by a bat fowling-net. The flesh is accounted tolerable by many. The sparrow has no song, only a chirp or two frequently repeated; and far from agreeable. This species is spread every where throughout Europe; and is also met with in Egypt, Senegal, Syria, and other parts of Africa and Asia.

5. The *spinus*, or SISKIN, hath the prime feathers of the wings yellow in the middle, and the four first chief tail-feathers without spots; but they are yellow at the base,

Fringilla.

Fringilla. base, and black at the points. Mr Willoughby tells us, that this is a song-bird; that in Suffex it is called the *barley-bird*, because it comes to them in barley-feed time. We are informed that it visits these islands at very uncertain times, like the gros beak, &c. It is to be met with in the bird-shops in London; and being rather a scarce bird, sells at a higher price than the merit of its song deserves: it is known there by the name of the *aberdavine*. It is a very tame and docile species; and is often kept and paired with the canary-bird, with which it breeds freely. The bird-catchers have a notion of its coming out of Russia. Dr Kramer informs us, that this bird conceals its nest with great art; and though there are infinite numbers of young birds in the woods on the banks of the Danube, which seem just to have taken flight, yet no one could discover it.

6. The *linota*, or LINNET, has the bottom of the breast of a fine blood-red, which heightens as the spring advances. These birds are much esteemed for their song. They feed on seeds of different kinds, which they peel before they eat; the seed of the linum or flax is their favourite food; from whence the name of the linnet tribe. They breed among furze and white thorn: the outside of their nest is made with moss and bents, and lined with wool and hair. They lay five whitish eggs, spotted like those of the goldfinch.

7. The *cannabina*, or GREATER RED-POLE, is rather less than the common linnet, and has a blood-coloured spot on the forehead, and the breast of the male is tinged with a fine rose-colour. It is a common fraud in the bird-shops in London, when a male-bird is distinguished from the female by a red-breast, as in the case of this bird, to stain or paint the feathers, so that the deceit is not easily discovered, without at least close inspection. These birds are frequent on our sea-coasts; and are often taken in flight-time near London: it is a familiar bird; and is cheerful in five minutes after it is caught.

8. The *linaria*, or LESSER RED-POLE, is about half the size of the last, and a rich spot of purplish red on the forehead: the breast is of the same colour, but less bright. The female is less lively in colour; has no red on the breast; and the spot on the forehead is of a saffron hue. This species is common enough in England; and lays four or five eggs of a pale bluish green, thickly sprinkled near the blunt end with small reddish spots. Mr Pennant mentions an instance of this bird being so tenacious of her nest, as to suffer herself to be taken off by the hand; and that when released she would not forsake it. This species is known about London by the name of *stone redpole*. Linnæus, Kramer, and others, mention its being very fond of the seeds of alder. Whole flocks of them, mixed with the skink, frequent places where alders grow, for the sake of picking the carkins: they generally hang like the titmouse, with the back downwards; and in this state are so intent on their work, that they may be entangled one after another by dozens, by means of a twig smeared with birdlime fastened to the end of a fishing rod or other long pole. This species seems to be in plenty throughout Europe, from the extreme parts of Russia on the one hand to Italy on the other. Is very common in Greenland, and was also met with

by our late voyagers at Aoonalashka. In America it is likewise well known. Hence it seems to be a bird common to the whole of the northern part of the globe without exception.

9. The *montium*, or TWITE, is about the size of a linnet. It has the feathers of the upper part of the body dusky; those on the head edged with ash-colour, the others with brownish red: the rump is pale crimson; the wings and tail are dusky, the tips of the greater coverts and secondaries whitish; the legs pale brown. The female wants the red mark on the rump. Twites are taken in the flight-season near London along with other linnets. It is probable that the name has been taken from their twittering note, having no music in it; and indeed the bird-catchers will tell at some distance whether there be any twites mixed among linnets merely from this circumstance. The twite is supposed to breed in the more northern parts of our island.

10. The *amandava*, or AMADUVADE BIRD, is about the size of a wren. The colour of the bill is of a dull red; all the upper parts are brown, with a mixture of red; the under the same, but paler, the middle of the belly darkest; all the feathers of the upper wing-coverts, breast, and sides, have a spot of white at the tip; the quills are of a grey brown; the tail is black; and the legs are of a pale yellowish white. It inhabits Bengal, Java, Malacca, and other parts of Asia.

11. The *Senegala*, or SENEGAL FINCH, is a species very little bigger than a wren. The bill is reddish, edged all round with brown; and beneath the under mandible a line of brown quite to the tip; the same also is seen on the ridge of the upper mandible: the upper parts of the body are of a vinaceous red colour; the lower parts, with the thighs and under tail-coverts, of a greenish brown; the hind part of the head and neck, the back, scapulars, and wing-coverts, are brown; the tail is black; and the legs are pale grey. It inhabits Bengal; and, with the former species, feeds on millet. This affords the natives an easy method of catching them: they have no more to do than to support a large hollowed gourd, the bottom uppermost, on a stick, with a string leading to some covered place, and strewing under it some millet; the little birds, hastening in numbers to pick it up, are caught beneath the trap, by the stick being pulled away by the observer at a distance. The females are said to sing nearly as well as the males. They are familiar birds; and when once used to the climate, will frequently live five or six years in a cage. They have been bred in Holland by the fanciers of birds.

12. The *canaria*, or CANARY-BIRD, hath a whitish body and bill, with the prime feathers of the wings and tail greenish. It was originally peculiar to those isles to which it owes its name; the same that were known to the ancients by the addition of the *Fortunate*. Though the ancients celebrate the isle of Canaria for the multitude of birds, they have not mentioned any in particular. It is probable, then, that our species was not introduced into Europe till after the second discovery of these isles, which was between the 13th and 14th centuries. We are uncertain when it first made its appearance in this quarter of the globe. Be-lon, who wrote in 1555, is silent in respect to these birds: Gesner is the first who mentions them; and Al-drovand

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Frit.

drovand speaks of them as rarities, observing that they were very dear on account of the difficulty attending the bringing them from so distant a country, and that they were purchased by people of rank alone. They are still found on the same spot to which we were first indebted for the production of such charming songsters; but they are now become so numerous in our own country, that we are under no necessity of crossing the ocean for them.—The Canary-bird will prove fertile with the fishkin and goldfinch; but in this case the produce, for the most part, proves sterile: the pairs succeed best when the hen-bird is the Canary, and the cock of the opposite species. It will also prove prolific with the linnet, yellow-hammer, chaffinch, and even the house sparrow; but the male Canary-bird will not assimilate with the female of these birds; the hen must be ever of the Canary species; and the young of these mostly prove male-birds.—This bird is said by some to live 10 or 15 years; by others, as far as 18.

FRIPPERY, a French term sometimes used in our language to signify the trade or traffic of old second-hand clothes and goods. The word is also used for the place where such sort of commerce is carried on, and even for the commodities themselves. The company of frippers, or fripperers, at Paris, are a regular corporation, of an ancient standing, and make a considerable figure in that city.

FRISII, FRISEI, FRISIONES, and FRIONES, (anc. geog.), a people of Germany, so called either from their ardent love of freedom, or from the fresh and unbroken lands they occupied, contradicting distinguished from the old lands. Tacitus divides them, from their extent of power and territory, into the Majores, situated on the coast between the Rhine and the Ems; and into the Minores, occupying the parts about the lakes lying between the channels of the Rhine.

FRIT, or FRITT, in the glass manufacture, is the matter or ingredients whereof glass is to be made, when they have been calcined or baked in a furnace.

A salt drawn from the ashes of the plant kali or from fern, or other plants mixed with sand or flint, and baked together, makes an opaque mass called by glass-men *frit*; probably from the Italian *frittare*, to fry; or because the frit, when melted, runs into lumps, like fritters, called by the Italians *fritelli*.

Frit, by the ancients, was called *ammonitrum*, of *ἄμμον*, sand, and *νίτρον*, nitre; under which name it is described by Pliny thus: Fine sand from the Volturian sea, mixed with three times the quantity of nitre, and melted, makes a mass called *ammonitrum*; which being rebaked makes pure glass.

Frit, Neri observes, is only the calx of the materials which make glass; which though they might be melted, and glass be made, without thus calcining them, yet it would take up much more time. This calcining, or making of frit, serves to mix and incorporate the materials together, and to evaporate all the superfluous humidity. The frit, once made, is readily fused, and turned into glass.

There are three kinds of frits. The first, crystal frit, or that for crystal metal, is made with salt of pulverine and sand. The second, and ordinary frit, is made of the bare ashes of pulverine or barilla, without extracting the salt from them. This makes the ordinary white or crystal metal. The third is frit for green

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glass, made of common ashes, without any preparation. This last frit will require ten or twelve hours baking.

The materials in each are to be finely powdered, washed, and sieved; then equally mixed, and frequently stirred together in the melting pot. For the rest see GLASS, and CRYSTAL.

FRITH, in its most usual acceptance, signifies the mouth or opening of a river into the sea; such are the Frith of Forth or of Edinburgh, the Frith of Clyde, Moray Frith, &c.

FRITILLARIA, FRITILLARY: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 10th order, *Coronaria*. The corolla is hexapetalous and campanulate, with a nectariferous cavity above the heel in each petal; the stamina are as long as the corolla. There are five species, all of them bulbous-rooted flowery perennials, producing annual stalks from about one foot to a yard or more high, terminated by large, bell-shaped, lilaceous flowers, of a great variety of colours. They are all propagated by offsets, which they furnish abundantly from the sides of their roots, and which may be separated every second or third year; they are hardy plants, and will thrive in any of the common borders.

FRIULI, a province of Italy, subject to Venice, and bounded by Carinthia in Germany on the north, by Carniola on the east, by the Gulph of Venice on the south, and by the Bellunese and Feltrin on the west.

FRIZE, or FRIEZE, in architecture, a part of the entablature of columns, more usually written and pronounced *freeze*. See FREEZE.

FRIZE, or FREEZE, in commerce, a kind of woollen cloth or stuff for winter wear, being frized or knapt on one side; whence, in all probability, it derives its name.

Of frizes, some are crossed, others not crossed: the former are chiefly of English manufacture, the latter of Irish.

FRIZING of CLOTH, a term in the woollen manufactory, applied to the forming of the nap of cloth or stuff into a number of little hard burrs or prominences, covering almost the whole ground thereof.

Some cloths are only frized on the back side, as black cloths; others on the right side, as coloured and mixed cloths, rateens, bays, friezes, &c.

Frizing may be performed two ways. One with the hand, that is, by means of two workmen, who conduct a kind of plank that serves for a frizing instrument. The other way is by a mill, worked either by water or a horse, or sometimes by men. This latter is esteemed the better way of frizing, by reason the motion being uniform and regular, the little knobs of the frizing are formed more equably and regularly. The structure of this useful machine is as follows:

The three principal parts are the frizer or crisper, the frizing table, and the drawer or beam. The two first are two equal planks or boards, each about 10 feet long and 15 inches broad; differing only in this, that the frizing-table is lined or covered with a kind of coarse woollen stuff, of a rough sturdy nap; and the frizer is incrustated with a kind of cement composed of glue, gum-arabic, and a yellow sand, with a little aqua-vitæ, or urine. The beam, or drawer, thus called,

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ed, because it draws the stuff from between the frizer and the frizing-table, is a wooden roller, beset all over with little, fine, short points or ends of wire, like those of cards used in carding of wool.

The disposition and use of the machine is thus. The table stands immoveable, and bears or sustains the cloth to be frized, which is laid with that side uppermost on which the nap is to be raised: over the table is placed the frizer, at such a distance from it as to give room for the stuff to be passed between them: so that the frizer, having a very slow semicircular motion, meeting the long hairs or naps of the cloth, twists, and rolls them into little knobs or burrs; while, at the same time, the drawer, which is continually turning, draws away the stuff from under the frizer, and winds it over its own points.

All that the workman has to do while the machine is a-going, is to stretch the stuff on the table as fast as the drawer takes it off, and from time to time to take off the stuff from the points of the drawer.

The design of having the frizing-table lined with stuff of a short, stiff, stubby nap, is that it may detain the cloth between the table and the frizer long enough for the grain to be formed, that the drawer may not take it away too readily, which must otherwise be the case, as it is not held by any thing at the other end. It were unnecessary to say any thing particular of the manner of frizing stuffs with the hand, it being the aim of the workmen to imitate, as near as they can with their wooden instrument, the slow, equable, and circular motion of the machine: it needs only be added, that their frizer is but about two feet long and one broad; and that to form the nap more easily, they moisten the surface of the stuff lightly, with water mingled with whites of eggs or honey.

FROBENIUS (John), a famous and learned printer in the 16th century, was born at Hamelburgh in Franconia, and settled at Basil. He had before studied in that university, where he acquired the reputation of being uncommonly learned; and now setting up a printing-house in that city, was the first of the German printers who brought that admirable art to any degree of perfection. Being a man of great probity and piety, as well as skill, he was particularly choice in the authors he printed; and would never, for the sake of profit, suffer libels, or any thing that might hurt the reputation of another, to go through his press. The great character of this printer was the principal motive which induced Erasmus to reside at Basil, in order to have his own works printed by him. A great number of valuable authors were printed by Frobenius, with great care and accuracy; among which were the works of St Jerome, Augustine, and Erasmus. He designed to have printed the Greek Fathers; but died in 1527, before he could execute his design. Erasmus wrote his epitaph in Greek and Latin.

John Frobenius left a son, named *Jerome Frobenius*, and a daughter married to Nicholas Episcopus; who, joining in partnership, continued Frobenius's printing-house with reputation, and printed correct editions of the Greek Fathers.

FROBISHER, or FROBISHER (Sir Martin), an excellent navigator and sea-officer in the 16th century, was born near Doncaster in Yorkshire, and was from

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Frog.

his youth brought up to navigation. He was the first Englishman who attempted to find a north-west passage to China, and in 1576 he sailed with two barks and a pinnace in order to attempt that passage. In this voyage he discovered a cape, to which he gave the name of *Queen Elizabeth's Foreland*, and the next day discovered a strait to which he gave his own name. This voyage proving unsuccessful, he attempted the same passage in 1577; but discovering some ore in an island, and his commission directing him in this voyage only to search for ore, and to leave the farther discovery of the north-west to another time, he returned to England. He sailed again, with 15 ships and a great number of adventurers, to form a settlement: but being obstructed by the ice, and driven out to sea by a violent storm, they, after encountering many difficulties, returned home, without making any settlement: but brought a large quantity of ore.—He afterwards commanded the *Aid* in Sir Francis Drake's expedition to the West Indies, in which St Domingo in Hispaniola, Carthagen, and Santa Justina, in Florida, were taken and sacked. In 1588, he bravely exerted himself in defence of his country against the Spanish armada, when he commanded the *Triumph*, one of the largest ships in that service; and, as a reward for his distinguished bravery, received the honour of knighthood from the lord high-admiral at sea. He afterwards commanded a squadron which was ordered to cruise on the Spanish coast; and in 1592 took two valuable ships and a rich carrack. In 1594 he was sent to the assistance of Henry IV. king of France against a body of the Leaguers and Spaniards, who had strongly entrenched themselves at Croyzon near Brest; but in an assault upon that fort, on the 7th of November, Sir Martin was unfortunately wounded with a ball, of which he died soon after he had brought back the fleet to Plymouth, and was buried in that town.

FROBISHER'S Straits, lie a little to the northward of Cape Farewell in West Greenland, and were discovered by Sir Martin Frobisher. W. Long. 48. 16. N. Lat. 63. 12.

FRODSHAM, a town of Cheshire in England, 162 miles from London, is noted for its ancient castle. It has a stone-bridge over the river Weaver near its conflux with the Mersey, and a harbour for ships of good burden. By the late inland navigation, it has communication with the rivers Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

FROG, in zoology. See RANA.

Bull-FROG. See RANA.

FROG-Fish of Surinam, a very singular animal, of which a figure is given by Mr Edwards, *Hist. of Birds*, Vol. I. There is no specimen in the British museum, nor in any private collection, except that of Dr Fothergill. It was brought from Surinam in South America.—Frogs, both in Asia and Africa, according to Merian, change gradually from fishes to frogs, as those in Europe; but after many years revert again into fishes, though the manner of their change has never been investigated. In Surinam these fishes are called *jakjés*. They are cartilaginous, of a substance like our

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mustela, and exquisite food: they are formed with regular vertebrae, and small bones all over the body divided into equal parts; are first darkish, and then grey: their scales make a beautiful appearance. Whether this animal is, in its perfect state, a species of frog with a tail, or a kind of water-lizard, Mr Edwards does not pretend to determine; but observes, that when its size is considered, if it should be deemed a tadpole at first produced from spawn, and in its progress towards a frog, such an animal, when full grown, if it bears the same proportion to its tadpole as those in Europe do, must be of enormous size; for our full grown frogs exceed the tadpoles at least 50 times. See a reduced figure on Plate CCIII.

FROME, a river that rises from several springs in the Western parts of Dorsetshire in England, the principal of which is near Evershot; and directing its course almost due west, passes under Frampton-bridge, washes the town of Dorchester, and falls into a bay of the English Channel called *Poolhaven*, near Wareham.

FROME-Selwood, a town of Somersetshire in England, 105 miles from London. It is the chief town of this part of the country, which was anciently one great forest called *Selwoodshire*; and in the latter end of the last century, in those called *Frome-Woodlands*, there was a considerable gang of money-coiners or clippers, of whom many were taken and executed, and their covert laid open. Though the town is bigger than some cities, yet it has only one church; but it has six or seven meeting-houses of Protestant dissenters. The inhabitants are reckoned about 13,000, whose chief manufactory is broad-cloth. About 50 years ago, more wire cards for carding the wool for the spinners were made at this place than in all England besides, which was for the most part supplied with them from hence; for here were no less than 20 master card-makers, one of whom employed 400 men, women, and children, in that manufactory at one time; so that even children of 7 or 8 years of age could earn half-a-crown a-week. The river here, which abounds with trout, eels, &c. rises in the woodlands; and runs under its stone-bridge towards Bath, on the east side of which it falls into the Avon. This town has been a long time noted for its fine beer, which they keep to a great age, and is generally preferred by the gentry to the wines of France and Portugal. It was governed formerly by a bailiff, and now by two constables of the hundreds of Frome, chosen at the court-leet of the lord of the manor.

FRONDESCENTIA, from *frons*, "a leaf;" the precise time of the year and month in which each species of plants unfolds its first leaves.

All plants produce new leaves every year; but all do not renew them at the same time. Among woody plants, the elder, and most of the honey-suckles; among perennial herbs, crocus and tulip, are the first that push or expand their leaves. The time of sowing the seeds decides with respect to annuals. The oak and ash are constantly the latest in pushing their leaves: the greatest number unfold them in spring; the mosses and ferns in winter. These striking differences with respect to so capital a circumstance in plants as that of unfolding their leaves, seem to indicate that each species of plants has a temperature proper or pe-

culiar to itself, and requires a certain degree of heat to extricate the leaves from their buds, and produce the appearance in question.

This temperature, however, is not so fixed or constant as it may appear to a superficial observer. Among plants of the same species, there are some more early than others; whether that circumstance depends, as it most commonly does, on the nature of the plants, or is owing to differences in heat, exposure, and soil. In general, it may be affirmed, that small and young trees are always earlier than larger or old ones.

The pushing of the leaves is likewise accelerated or retarded according to the temperature of the season; that is, according as the sun is sooner or later in dispensing that certain degree of heat which is suitable to each species.

FRONT, the forehead, or that part of the face above the eyebrows. The word is formed of the Latin *frons*; and that from the Greek *φρονειν* "to think, perceive;" of *φρονεω* mens, "the mind, thought." Martinius, to make out this etymology, observes, that from the forehead of a person we perceive what he is, what he is capable of, and what he thinks of.

FRONT is also used where several persons or things are ranged side by side, and show their front or fore-parts.

FRONT, in architecture, denotes the principal face or side of a building, or that presented to their chief aspect or view.

FRONTAL, in architecture, a little fronton or pediment, sometimes placed over a small door or window.

FRONTAL, *Frontlet*, or *Brow-band*, is also used in speaking of the Jewish ceremonies. This frontal consists of four several pieces of vellum, on each whereof is written some text of scripture. They are all laid on a piece of a black calf's leather with thongs to tie it by. The Jews apply the leather with the vellum on their foreheads in the synagogue, and tie it round the head with the thongs.

FRONTIER, the border, confine, or extreme, of a kingdom or province, which the enemies find in front when they would enter the same. Thus we say, a frontier town, frontier province, &c. Frontiers were anciently called *marches*.

The word is derived from the French *frontiere*, and that from the Latin *frontaria*; as being a kind of front opposed to the enemy. Skinner derives *frontier* from *front*; inasmuch as the frontier is the exterior and most advanced part of a state, as the front is that of the face of a man.

FRONTIGNIAC WINE, is so called from a town of Languedoc in France, situated 16 miles south-west of Montpellier, remarkable for producing it.

FRONTINUS (Sextus Julius), an ancient Roman writer, was of consular dignity, and flourished under the emperors Vespasian, Titus, Domitian, Nerva, and Trajan. He commanded the Roman armies in Britain; was made city-prætor when Vespasian and Titus were consuls; and Nerva made him curator of the aqueducts, which occasioned his writing *De aqueductibus urbis Romæ*. He wrote four books upon the Greek and Roman art of war; a piece *De re agraria*, and another *De limitibus*. These have been often separate-

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ly reprinted; but were all collected together in a neat edition at Amsterdam in 1661, with notes by Robertus Keuchenius. He died under Trajan.

FRONTISPIECE, in architecture, the principal face of a fine building. The word is formed of the Latin *frontispicium*, q. d. *frontis hominis inspectio*.—Hence also, by a figure, we say, the frontispiece of a book; meaning an ornament with an engraven title on the first page.

FRONTLET. See **FRONTAL**.

FRONTO (Marcus Cornelius), was chosen for his eloquence to instruct the emperors Marcus Aurelius and Lucius Verus in rhetoric; in recompence of which he was promoted to the consulate, and a statue was erected to his honour. He taught Marcus Aurelius not only eloquence, but the duty of kings, and excellent morals. Some say he wrote against the Christians. A sect was formed of those who looked upon him as a model of perfect eloquence, and these were called *Frontoniani*. The Civilians, whose names were *Fronto*, mentioned in the pandects, were probably descended from him.

FROST, in physiology, such a state of the atmosphere as occasions the congelation or freezing of water and other fluids. See **CONGELATION**.

Under the articles **COLD**, **CONGELATION**, **EVAPORATION**, **FLUIDITY**, &c. it is shown, that water and other fluids are capable of containing the element of fire or heat in two very different states. In the one, they seem to imbibe the fire in such a manner, that it eludes all the methods by which we are accustomed to observe it, either by our sensation of feeling, or the thermometer; in the other, it manifests itself obviously to our senses, either by the touch, the thermometer, or the emission of light.

In the first of these states, we call the body *cold*; and are apt to say that this coldness is occasioned by the *absence* of heat. But this manner of expressing ourselves is certainly improper; for even those fluids which are coldest to the touch contain a vast deal of heat. Thus vapour, which is colder to the touch than the water from which it was raised, contains an immense quantity of fire, even more than sufficient to heat it red hot. The like may be said of common salt, and snow, or ice. If a quantity of each of these substances is separately reduced to the degree of 28 or 30 of Fahrenheit's thermometer, upon mixing them together, the heat which would have raised the thermometer to the degree above mentioned, now enters into the substance of them in such a manner that the mercury falls down to 0.—Here an excessive degree of cold is produced, and yet we are sure that the substances contain the very same quantity of heat that they formerly did: nay, they will even seem exceedingly cold, when they most certainly contain a great deal more heat than they originally did; for they absorb it from all bodies around them; and if a small vessel full of water is put in the middle of such a mixture, it will in a short time be full of ice.

It appears, therefore, that our senses, even when assisted by thermometers, can only judge of the state in which the element of fire is with relation to the bodies around us, without regard to the quantity contained in them. Thus, if heat flows from any part of our body into any substance actually in contact with it, the

sensation of cold is excited, and we call that substance *cold*; but if it flows from any substance into our body, the sensation of heat is excited, and we call that substance *hot*, without regard to the absolute quantity contained in either case. See **HEAT**.

Of all known substances, the atmosphere either absorbs or throws out heat with the most remarkable facility: and in one or other of these states it always is with respect to the surface of the earth, and such bodies as are placed on or near it; for these, properly speaking, have no temperature of their own, but are entirely regulated by that of the atmosphere.—When the air has been for some time absorbing the heat from terrestrial bodies, a frost must be the undoubted consequence, for the same reason that water freezes in a vessel put into a freezing mixture; and were this absorption to continue for a length of time, the whole earth would be converted into a frozen mass. There are, however, certain powers in nature, by which this effect is always prevented; and the most violent frost we can imagine, must always as it were defeat its own purposes, and end in a thaw. To understand this subject, we must observe,

1. In that state of the atmosphere which we denominate frost, there is a most intimate union between the air and the water it contains; and therefore frosty weather, except in very high latitudes, is generally clear.

2. When such an union takes place, either in winter or summer, we observe the atmosphere also inclined to absorb heat, and consequently to frost. Thus in clear settled weather, even in summer, though the day may be excessively hot by reason of the continued sunshine, yet the mornings and evenings are remarkably cold, and sometimes even disagreeably so.

3. The air being therefore always ready in the time of frost, or in clear weather, to absorb heat from every substance which comes into contact with it, it follows that it must also absorb part of that which belongs to the vapours contained in it.

4. Though vapour is capable of becoming much colder than water without being frozen, yet by a continued absorption it must at last part with its latent heat, i. e. that which essentially constitutes it vapour; and without which it is no longer vapour, but water or ice. No sooner, therefore, does the frost arrive at a certain pitch, than the vapours, every where dispersed through the air, give out their latent heat: the atmosphere then becomes clouded; the frost either totally goes off, or becomes milder by reason of the great quantity of heat discharged into the air; and the vapours descend in rain, hail, or snow, according to the particular disposition of the atmosphere at the time.

5. Even in the polar regions, where it may be thought that the frost must increase beyond measure, there are also natural means for preventing its running to extremes. The principal cause here is, the mixture of a great quantity of vapours from the more temperate regions of the globe with the air in those dreary climates. It is well known, that aqueous vapour always flies from a warm to a colder place. For this reason, the vapours raised by the sun in the more temperate regions of the earth, must continually travel northward and southward in great quantities. Thus

Frost.

Frost.

they furnish materials for those immense quantities of snow and ice which are to be found in the neighbourhood of the poles, and which we cannot imagine the weak influence of the sun in these parts capable of raising. It is impossible that a quantity of vapour can be mixed with frosty air, without communicating a great deal of heat to it; and thus there are often thaws of considerable duration even in those climates where, from the little influence of the sun, we should suppose the frost would be perpetual.

6. We may now account with some probability for the uncertain duration of frosts. In this country they are seldom of a long continuance; because the vapours raised from the sea with which our island is surrounded, perpetually mix with the air over the island, and prevent a long duration of the frost. For the same reason, frosts are never of such long duration in maritime places on the continent as in the inland ones. There is nothing, however, more uncertain than the motion of the vapours with which the air is constantly filled; and therefore it is impossible to prognosticate the duration of a frost with any degree of certainty. In general, we may always be certain, that if a quantity of vapour is accumulated in any place, no intense frost can subsist in that place for any length of time; and by whatever causes the vapours are driven from place to place, by the same causes the frosts are regulated throughout the whole world. See THAW, VAPOUR, &c.

The effects of frost in several different countries, are enumerated under the article CONGELATION. In the northern parts of the world, even solid bodies are liable to be affected by frost. Timber is often apparently frozen, and rendered exceedingly difficult to saw. Marble, chalk, and other less solid terrestrial concretions, will be shattered by strong and durable frosts. Metals are contracted by frost: thus, an iron tube, 12 feet long, upon being exposed to the air in a frosty night, lost two lines of its length. On the contrary, frost swells or dilates water near one-tenth of its bulk. Mr Boyle made several experiments with metalline vessels, exceedingly thick and strong; which being filled with water, close stopped, and exposed to the cold, burst by the expansion of the frozen fluid within them. Trees are frequently destroyed by frost, as if burnt up by the most excessive heat; and in very strong frosts, walnut-trees, ashes, and even oaks, are sometimes split and cleft, so as to be seen through, and this with a terrible noise, like the explosion of fire-arms.

Frost naturally proceeds from the upper parts of bodies downwards; but how deep it will reach in earth or water, is not easily known; because this depth may vary with the degree of coldness in the air, by a longer or shorter duration of the frost, the texture of the earth, the nature of the juices wherewith it is impregnated, the constitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr Boyle, in order to ascertain this depth, after four nights of hard frost, dug in an orchard, where the ground was level and bare, and found the frost had scarce reached three inches and a half, and in a garden nearer the house only two inches below the surface. Nine or ten successive frosty nights froze the bare

ground in the garden six inches and a half deep; and in the orchard, where a wall sheltered it from the south sun, to the depth of eight inches and a half. He also dug in an orchard, near a wall, about a week afterwards, and found the frost to have penetrated to the depth of 14 inches. In a garden at Moscow, the frost in a hard season only penetrates to two feet: and the utmost effect that Captain James mentions the cold to have had upon the ground of Charlton island, was to freeze it to 10 feet deep: whence may appear the different degrees of cold of that island and Russia. And as to the freezing of water at the abovementioned island, the Captain tells us, it does not naturally congeal above the depth of six feet, the rest being by accident. Water also, exposed to the cold air in large vessels, always freezes first at the upper surface, the ice gradually increasing and thickening downwards: for which reason, frogs retire in frosty weather to the bottom of ditches; and it is said, that shoals of fish retire in winter to those depths of the sea and rivers, where they are not to be found in summer. Water, like the earth, seems not disposed to receive any very intense degree of cold at a considerable depth or distance from the air. The vast masses of ice found in the northern seas being only many flakes and fragments, which, sliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the frost often proves fatal to mankind; not only producing gangrenes, but even death itself. Those who die of it have their hands and feet first seized, till they grow past feeling it; after which the rest of their bodies is so invaded, that they are taken with a drowsiness, which if indulged, they awake no more, but die insensibly. But there is another way whereby it proves mortal, viz. by freezing the abdomen and viscera, which on dissection are found to be mortified and black.

The great power of frost on vegetables is a thing sufficiently known; but the differences between the frosts of a severe winter, and those which happen in the spring mornings, in their effects on plants and trees, were never perfectly explained, till by Mess. Du Hamel and Buffon in the Memoirs of the Paris Academy.

The frosts of severe winters are much more terrible than those of the spring, as they bring on a privation of all the products of the tenderer part of the vegetable world; but then they are not frequent, such winters happening perhaps but once in an age; and the frosts of the spring are in reality greater injuries to us than these, as they are every year repeated.

In regard to trees, the great difference is this, that the frosts of severe winters affect even their wood, their trunks and large branches; whereas those of the spring have only power to hurt the buds.

The winter frosts happening at a time when most of the trees in our woods and gardens have neither leaves, flowers, nor fruits upon them, and have their buds so hard as to be proof against slight injuries of weather, especially if the preceding summer has not been too wet; in this state, if there are no unlucky circumstances attending, the generality of trees bear moderate winters very well; but hard frosts, which happen late

Frost.

Frost.

in the winter; cause very great injuries even to those trees which they do not utterly destroy. These are, 1. Long cracks following the direction of the fibres. 2. Parcels of dead wood inclosed round with wood yet in a living state. And, 3. That distemperature which the foresters call the *double blea*, which is a perfect circle of blea, or soft white wood, which, when the tree is afterwards felled, is found covered by a circle of hard and solid wood.

The opinions of authors about the exposition of trees to the different quarters, have been very different, and most of them grounded on no rational foundation. Many are of opinion that the effects of frost are most violently felt on those trees which are exposed to the north; and others think the south or the west the most strongly affected by them. There is no doubt but the north exposure is subject to the greatest cold. It does not, however, follow from this, that the injury must be always greatest on the trees exposed to the north in frosts: on the contrary, there are abundant proofs that it is on the south side that trees are generally more injured by frost: and it is plain from repeated experiments, that there are particular accidents, under which a more moderate frost may do more injury to vegetables, than the most severe one which happens to them under more favourable circumstances.

It is plain from the accounts of the injuries trees received by the frosts in 1709, that the greatest of all were owing to repeated false thaws, succeeded by repeated new frosts. But the frosts of the spring-season furnish abundantly more numerous examples of this truth; and some experiments made by the Count de Buffon, at large in his own woods, prove incontestably, that it is not the severest cold or most fixed frost that does the greatest injury to vegetables.

This is an observation directly opposite to the common opinion; yet is not the less true, nor is it any way discordant to reason. We find by a number of experiments, that humidity is the thing that makes frost fatal to vegetables; and therefore every thing that can occasion humidity in them, exposes them to these injuries, and every thing that can prevent or take off an over proportion of humidity in them, every thing that can dry them though with ever so increased a cold, must prevent or preserve them from those injuries. Numerous experiments and observations tend to prove this. It is well known that vegetables always feel the frost very desperately in low places where there are fogs. The plants which stand by a river side are frequently found destroyed by the spring and autumnal frosts, while those of the same species, which stand in a drier place, suffer little or perhaps not at all by them; and the low and wet parts of forests are well known to produce worse wood than the high and drier. The coppice wood in wet and low parts of common woods, though it push out more vigorously at first than that of other places, yet never comes to so good a growth; for the frost of the spring killing these early top-shoots, obliges the lower part of the trees to throw out lateral branches: and the same thing happens in a greater or lesser degree to the coppice wood that grows under cover of larger trees in great forests; for here the vapours not being carried off either by the sun or wind, stagnate and freeze, and in the same manner de-

stroy the young shoots, as the fogs of marshy places. It is a general observation also, that the frost is never hurtful to the late shoots of the vine, or to the flower-buds of trees, except when it follows heavy dews, or a long rainy season, and then it never fails to do great mischief, though it be ever so slight.

The frost is always observed to be more mischievous in its consequences on newly cultivated ground than in other places; and this is, because the vapours which continually arise from the earth, find an easier passage from those places than from others. Trees also which have been newly cut, suffer more than others by the spring frosts, which is owing to their shooting out more vigorously.

Frosts also do more damage on light and sandy grounds, than on the tougher and firmer soils, supposing both equally dry; and this seems partly owing to their being more early in their productions, and partly to their lax texture suffering a greater quantity of vapours to transpire.

It also has been frequently observed; that the side-shoots of trees are more subject to perish by the spring frosts than those from the top; and M. Buffon, who examined into this with great accuracy, always found the effects of the spring frosts much greater near the ground than elsewhere. The shoots within a foot of the ground quickly perished by them; those which stood at two or three feet high, bore them much better; and those at four feet and upwards frequently remained wholly unhurt, while the lower ones were entirely destroyed.

There is a series of observations, which have proved beyond all doubt, that it is not the hard frosts which so much hurt plants, as those frosts, though less severe, which happen when they are full of moisture; and this clearly explains the account of all the great damages done by the severe frosts being on the south side of the trees which are affected by them, though that side has been plainly all the while less cold than the north. Great damage is also done to the western sides of trees and plantations, when after a rain with a west wind the wind turns about to the north at sunset, as is frequently the case in spring, or when an east wind blows upon a thick fog before sun-rising.

Hoar-Frost, a cold moist vapour, that is drawn up a little way into the air, and in the night falls again on the earth, where it is congealed into icy crystals of various figures. Hoar-frost, therefore, is nothing but dew turned into ice by the coldness of the air.

Melioration of Aromatic Spirits by Frost. Mr Baumé observes, that aromatic spirituous waters have less scent when newly distilled than after they have been kept about six months: and he found that the good effects of age was produced in a short time by means of cold; and that, by plunging quart-bottles of the liquor into a mixture of pounded ice and sea-salt, the spirit, after having suffered for six or eight hours the cold hence resulting, proves as grateful as that which hath been kept many years. Simple waters also, after having been frozen, prove far more agreeable than they were before. Geoffroy takes notice of this melioration by frost; *Hist. Acad.* 1713.

Melioration of Land by Frost. See AGRICULTURE, n° 137.

Frost.

FROTH,

Froth
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Fructescen-
tia.

FROTH, a white light substance, formed on the surface of fluids by vehement agitation, consisting of little spherules or globules.

FROTH-Spit, or *Cuckow-Spit*, a name given to a white froth, or spume, very common in the spring and first months of summer, on the leaves of certain plants, particularly on those of the common white field-lychnis or catch-fly; thence called by some *spatling poppy*.

All writers on vegetables have taken notice of this froth, though few have understood the cause or origin of it till of late. It is formed by a little leaping animal, called by some the *flea grass-hopper*, by applying its anus close to the leaf, and discharging thereon a small drop of a white viscous fluid, which, containing some air in it, is soon elevated into a small bubble: before this is well formed, it deposits such another drop; and so on, till it is every way overwhelmed with a quantity of these bubbles, which form the white froth which we see. Within this spume it is seen to acquire four tubercles on its back, wherein the wings are inclosed: these bursting, from a repulse it becomes a winged animal: and thus, rendered perfect, it flies to meet its mate, and propagate its kind. It has an oblong, obtuse body, and a large head with small eyes. The external wings, for it has four, are of a dusky brown colour, marked with two white spots: the head is black. It is a species of *Cicada*.

FROWDE (Philip), an English poet, was the son of a gentleman who had been post-master in the reign of queen Anne. He was sent to the university of Oxford, where he had the honour of being distinguished by Addison, who took him under his protection. While he remained there, he became the author of several pieces of poetry, some of which in Latin were pure and elegant enough to intitle them to a place in the *Musa Anglicana*. He likewise wrote two tragedies: *The Fall of Saguntum*, dedicated to Sir Robert Walpole; and *Philotas*, addressed to the earl of Chesterfield. He died at his lodgings at Cecil-street in the Strand, in 1738, and in the London Daily-Post had the following character given him: "Though the elegance of Mr Frowde's writings has recommended him to the general public esteem, the politeness of his genius is the least amiable part of his character; for he esteemed the talents of wit and learning only as they were conducive to the excitement and practice of honour and humanity. Therefore, with a soul cheerful, benevolent, and virtuous, he was in conversation genteelly delightful, in friendship punctually sincere, in death Christianly resigned. No man could live more beloved, no private man could die more lamented." A fine eulogy! and we have no reason to doubt the truth of it.

FRUCTESCENCIA, (from *fructus*, "fruit,") comprehends the precise time in which, after the fall of the flowers, the fruits arrive at maturity, and disperse their seeds.

In general, plants which flower in spring, ripen their fruits in summer, as rye; those which flower in summer, have their fruits ripe in autumn, as the vine; the fruit of autumnal flowers ripens in winter, or the following spring, if kept in a stove or otherwise defended from excessive frosts. These frosts, says M. Adanson, are frequently so pernicious and violent as to destroy the greatest part of the perennial plants of Vir-

ginia and Mississippi, that are cultivated in France, even before they have exhibited their fruit. The plants which flower during our winter, such as those of the Cape of Good Hope, ripen their fruit in spring in our stoves.

FRUCTIFEROUS, signifies properly any thing that produces fruit.

FRUCTIFICATION OF PLANTS, is defined by Linnæus to be the temporary part of a vegetable appropriated to generation, terminating the old vegetable, and beginning the new. It consists of the following seven parts; viz. the calyx, corolla, stamen, pistillum, pericarpium, semen or seed, and receptaculum. See **BOTANY**, p. 446.

FRUIT, in its general sense, includes whatever the earth produces for the nourishment and support of animals; as herbs, grain, pulse, hay, corn, flax, and every thing expressed by the Latins under the name *fruges*.

FRUIT, in natural history, denotes the last production of a tree or plant, for the propagation or multiplication of its kind; in which sense fruit includes all kinds of seeds, with their furniture, &c.

FRUIT, in botany, is properly that part of a plant wherein the seed is contained; called by the Latins *fructus*; and by the Greeks καρπός. The fruit in the Linnæan system is one of the parts of fructification, and is distinguished into three parts, viz. the pericarpium, seed, and receptacle or *receptaculum seminum*. See **BOTANY**.

Colours Extracted from FRUITS. See the article *Colour-Making*, n° 36.

Bread-Fruit. See **BREAD**.

FRUITS, with regard to commerce, are distinguished into *recent* or *fresh*, and *dry*.

Recent FRUITS, are those sold just as they are gathered from the tree, without any farther preparation; as are most of the productions of our gardens and orchards, sold by the fruiterers.

Dry FRUITS, are those dried in the sun, or by the fire, with other ingredients sometimes added to them to make them keep; imported chiefly from beyond sea, and sold by the grocers. Such are raisins, currants, figs, capers, olives, cloves, nutmegs, pepper, and other spices; which see under their respective articles.

Under the denomination of *dry fruits* are also frequently included apples, pears, almonds, filberds, &c.

FRUIT-Flies, a name given by gardeners and others to a sort of small black flies found in vast numbers among fruit-trees, in the spring season, and supposed to do great injury to them. Mr Lewenhoeck preserved some of these flies for his microscopical observations. He found that they did not live longer than a day or two, but that the females during this time laid a great number of longish eggs. The gardeners who suppose that these flies wound the leaves of the trees, are mistaken: it is true that they feed on their juices; but they have no instruments wherewith they can extract these for themselves; they feed on such as are naturally extravasated; and when there is not a sufficient quantity of these for their purpose, they haunt the places to which the pucerons resort, and feed on the juices which these little creatures extravasate by means of the holes they bore in the leaves with their trunks.

FRUIT-Stones. The mischiefs arising from the custom which many people have of swallowing the stones of

Fructi-
ferous
||
Fruit.

of plums and other fruit are very great. The Philosophical Transactions give an account of a woman who suffered violent pains in her bowels for 30 years, returning once in a month or less. At length, a strong purge being given her, the occasion of all these complaints was driven down from the bowels to the anus; where it gave a sensation of distension and stoppage, producing a continual desire of going to stool, but without voiding any thing. On the assistance of a careful hand in this case, there was taken out with a forceps a ball of an oval figure, of about ten drachms in weight, and measuring five inches in circumference. This had caused all the violent fits of pain which she had suffered for so many years; and, after voiding it, she became perfectly well. The ball extracted looked like a stone, and felt very hard, but it swam in water. On cutting it through with a knife, there was found in the centre of it a plum-stone; round which, several coats of this hard and tough matter had gathered. Another instance given in the same papers is of a man, who, dying of an incurable colic which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found a ball similar to that above mentioned; but somewhat larger, being six inches in circumference, and weighing an ounce and an half. In the centre of this, as of the other, there was found the stone of a common plum, and the coats were of the same nature with those of the former.

These and several other instances mentioned in the same place, sufficiently show the folly of that common opinion that the stones of fruits are wholesome. For though by nature the guts are so defended by their proper mucus, that people very seldom suffer by things of this kind; yet if we consider the various circumvolutions of the guts, their valves and cells, and at the same time consider the hair of the skins of animals we feed on, the wool or down on herbs and fruit, and the fibres, vessels, and nerves of plants, which are not altered by the stomach; it will appear a wonder that instances of this sort of mischief are not much more common. Cherry-stones, swallowed in great quantities, have occasioned the death of many people; and there have been instances even of the seeds of strawberries collecting into a lump in the guts, and causing violent disorders, which could not be cured without great difficulty.

Fruit-Trees. With regard to these it may be observed, 1. That the cutting and pruning them when young, scrimp their bearing, though it contributes to the richness and flavour of the fruit, as well as to the beauty of the tree. 2. That kernel-fruit trees come later to bear than stone-fruit trees: the time required by the first, before they come to any fit age for bearing, being one with another five years; but when they do begin, they bear in greater plenty than stone-fruit. 3. That stone-fruit, figs, and grapes, commonly bear considerably in three or four years, and bear full crops the fifth and sixth years; and hold it for many years, if well ordered. 4. That fruit-trees in the same neighbourhood will ripen a fortnight sooner in some grounds than in others of a different temperature. 5. That in the same country, hot or cold summers set considerably forwards, or put backwards, the same fruit. 6. That the fruit on wall-trees generally ripen before those on

standards, and those on standards before those on dwarfs. 7. That the fruit of all wall trees planted in the south and east quarters, commonly ripen about the same time, only those in the south rather earlier than those in the east; those in the west are later by eight or ten days; and those in the north, by 15 or 20. For the planting, pruning, grafting, &c. of fruit-trees, see the articles PLANTING, TRANSPLANTING, PRUNING, GRAFTING, ORCHARD, NURSERY, &c.

FRUITERY, a place for the keeping of fruit, a fruit-house, or fruit-loft.

A fruitery should be inaccessible to any thing of moisture; and should be as much as possible so, even to frost.

FRUMENTACEOUS, a term applied by botanists to all such plants as have a conformity with wheat, in respect of their fruits, leaves, ears, or the like.

FRUMENTARII, a kind of soldiers or archers under the western empire.

The first time we read of these officers is in the reign of the emperor Adrian, who made use of them to inform himself of whatever passed. They did not make any particular corps distinct from the rest of the forces, but there was a certain number of them in each legion. It is supposed, that they were at first a number of young persons, disposed by Augustus throughout the provinces, particularly on all the grand roads, to acquaint the emperor, with all expedition, of every thing that happened.

Afterwards they were incorporated into the troops themselves, where they still retained their ancient name. As their principal office was the giving intelligence, they were often joined with the curiosi, with whom they agreed in this part of their office.

Their name of *frumentarii* is derived from their being also a sort of purveyors to the armies, cities, &c. collecting all the corn from the several provinces to furnish the commonwealth.

FRUMENTATION, in Roman antiquity, a largess of corn bestowed on the people. This practice of giving corn to the people was very ancient among the Romans, and frequently used to soothe the turbulent humour of the populace. At first the number of those to whom this largess was given was indeterminate, till Augustus fixed it at 200,000.

FRUSH, or **RUNNING-THRUSH**. See **FARRIERY**, Sect. xlv.

FRUSTUM, in mathematics, a part of some solid body separated from the rest.

The frustum of a cone is the part that remains, when the top is cut off by a plane parallel to the base; and is otherwise called a *truncated cone*. See **CONIC Sections**.

The frustum of a pyramid is also what remains after the top is cut off by a plane parallel to its base.

The frustum of a globe or sphere is any part thereof cut off by a plane, the solid contents of which may be found by this rule; To three times the square of the semidiameter of the base add the square of its height; then multiply that sum by the height, and this product multiplied by .5236 gives the solidity of the frustum.

FRUTEX, a **SHRUB**. Shrubs, according to Linnaeus, make a branch of the seventh family in the vegetable

Try
Fucus.

getable kingdom; and are distinguished from trees, in that they come up without buds. But this distinction is not universal, though it be generally just with regard to those of Europe. Nature hath made no absolute distinction between trees and shrubs. *Frutex*, in its general acceptation, is a plant whose trunk is perennial, gemmiparous, woody, dividing and subdividing into a great number of branches. In short, it is the epitome of a tree, exemplified in the rose-bush.

FRY, in zoology, signifies the spawn, or rather young, of fish.

FRYTH (John), a martyr to the Protestant religion in the reign of Henry VIII. He was the son of an inn-keeper at Seven-oaks in Kent; and educated in the king's college, Cambridge, where he took the degree of bachelor of arts. Thence he removed to Oxford, and was made a junior canon of Wolfey's college. He had not been long in this university before he became acquainted with William Tyndale, a zealous Lutheran, with whom he conversed frequently on the abuses in religion. Fryth became a convert to Lutheranism, and publicly avowed his opinions. He was apprehended, examined by the commissary, and confined to his college. At length having obtained his liberty, in 1528 he went over to Germany, where he continued about two years; and then returned to England, more than ever determined in his religious sentiments. Finding at that time but few associates, he wandered about from place to place, till at last he was taken up at Reading as a vagrant, and set in the stocks, where he remained till he was near expiring for want of sustenance. He was at length relieved by the humanity of Leonard Cox, a schoolmaster; who finding him a man of letters, procured his enlargement, and administered to his necessities. Fryth now set out for London, where, with more zeal than prudence, he began to make proselytes; but was soon apprehended by order of the chancellor Sir Thomas Moore, and sent prisoner to the Tower. Refusing to recant his opinions, he was condemned to the flames, and accordingly burnt in Smithfield, on the 4th of July 1533. He left several works behind him, which were printed in folio in 1573.

FUAGE, in old English writers, a tax of 12d. for every fire, levied in the time of Edward III.

FUCINUS LACUS (anc. geog.), a lake of Italy in the country of the Marfi. Now *Lago di Celano*, from a cognominal citadel, lying in the south of the Abruzzo Ultra, in the kingdom of Naples, near the Apennine. This lake was under the protection of a god of the same denomination, whose temple stood on its banks. According to the testimony of ancient authors, it was subject to extraordinary risings and decreasings. The actual circumference is 47 miles: the breadth in the widest part is 10, in the narrowest 4; its depth 12 feet upon an average. But all these have varied prodigiously. Two miles up the plain, behind Avezzano, the fragments of boats, shells, and other marks of its ancient extent, have been casually discovered: and, on the contrary, there are people who remember when it did not flow nearer than within two miles of Avezzano. An immense tract of excellent land is lost at every increase of its level. All round this noble piece of water rises a circle of grand mountains, some of them the highest in Italy, if we except

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the Alps, and many of them covered with snow; and at the foot of them are numerous villages, with rich and well cultivated farms. The environs of the lake, Mr Swinburn describes as all well inclosed, and the sides of the hills as covered with fine woods; its waters abound with fish of various kinds, and thither repair at stated seasons innumerable flocks of wild-fowl. As the swelling of the lake was attended with incredible damage, the Marfi had often petitioned the senate to drain it: Julius Cæsar would have attempted it, had he lived longer. His successors were averse to the project; till Claudius, who delighted in expensive difficult enterprizes, undertook it. During the space of 11 years he employed 30,000 men in digging a passage through the mountain; and when every thing was ready for letting off the water, exhibited a superb naval spectacle on the lake. A great number of condemned criminals were obliged to act the parts of Rhodians and Sicilians in separate fleets, to engage in earnest, and to destroy one another for the entertainment of the court and the multitude of spectators that covered the hills: A line of well-armed vessels and rafts loaded with soldiers surrounded the scene of action, in order to prevent any of the wretches from escaping; but it was with great difficulty and many threats that they could be brought to an engagement. When this savage diversion was ended, the operations for opening the emissary or outlet commenced, and the emperor was very near being swept away and drowned by the sudden rushing of the waters towards his vent. However, either through the ignorance or negligence of the engineers, the work did not answer as was expected, and Claudius did not live long enough to have the faults amended: Nero abandoned the scheme through envy. Hadrian is said to have let off the waters of the Fucinus; but none now escape except through hidden channels formed by nature, which are probably subject to be obstructed, and thus occasion a superabundance of water in the lake, till some unknown cause removes the obstructions and again gives free passage.

Sir William Hamilton, who visited the Fucinus in 1785, says, "it is the most beautiful lake he ever saw, and would be complete if the neighbouring mountains were better wooded." It furnishes abundance of fish, though not of the best quality. There are a few large trout, but mostly tench, barbel, and dace. In the shallow water on the borders of the lake, he saw thousands of water-snakes pursuing and preying upon a little kind of fish like our thornbacks, but much better armed; though their defensive weapons seemed to avail them but little against such ravenous foes. Claudius's emissary he describes as still entire, though filled up with earth and rubbish in many parts. He went into it with torches as far as he could. It is a covered underground canal three miles long, and part of it cut through a hard rock; and other parts supported by mason work, with wells to give light. Hadrian is said to have let off the waters of the lake: and our author is of opinion, that if the canal were cleared and repaired, it would still answer that purpose, and thereby restore a great deal of rich land fit for cultivation.

FUCUS, a name given by the ancients to certain dyes and paints. By this name they called a purple sea-plant used by them to dye woollen and linen things

Fucinus,
Fucus.

of

Fucus. of that colour. The dye was very beautiful, but not lasting; for it soon began to change, and in time went wholly off. This is the account Theophrastus gives of it.

The women of those times also used something called *fucus*, to stain their cheeks red; and many have supposed, from the same word expressing both, that the same substance was used on both occasions. But this, on a strict inquiry, proves not to be the case. The Greeks called every thing *fucus*, that would stain or paint the flesh. But this peculiar substance used by the women to paint their cheeks was distinguished from the others by the name of *rizion* among the more correct writers, and was indeed a root brought from Syria into Greece. The Latins, in imitation of the Greek name, called this root *radicula*, and Pliny very erroneously confounds the plant with the *radix lunaria*, or *struthion* of the Greeks.

The word *fucus* was in those times become such an universal name for paint, that the Greeks and Romans had a *fucus metallicus*, which was the cerus used for painting the neck and arms white; after which they used the *purpurissum*, or red *fucus* of the *rizium*, to give the colour to the cheeks. In after-times they also used a peculiar *fucus* or paint for the purpose, prepared of the *Creta argentaria*, or silver-chalk, and some of the rich purple dyes that were in use at that time: and this seems to have been very little different from our rose-pink; a colour commonly sold at the colour-shops, and used on like occasions.

Fucus, in the Linnæan system of botany, is a genus of the order of algæ, belonging to the cryptogamia class of plants. The most remarkable species are,

1. The *ferratus*, *ferrated fucus*, or *sea-wrack*. This is frequent at all seasons of the year upon the rocks at low-water mark, but produces its seeds in July and August. It consists of a flat, radical, and dichotomous leaf, about two feet long; the branches half an inch wide, ferrated on the edges with dents of unequal size, and at unequal distances, having a flat stalk or rib divided like the leaf, and running in the middle of it through all its various ramifications. A small species of coralline called by Linnæus *Sertularia pumila*, frequently creeps along the leaf. All the species of *fucus* afford a quantity of impure alkaline salt; but this much less than some others, eight ounces of the ashes yielding only three of fixed salt. The Dutch cover their crabs and lobsters with this *fucus* to keep them alive and moist; and prefer it to any other, as being destitute of those mucous vesicles with which some of the rest abound, and which would sooner ferment and become putrid.

2. The *vesiculosus*, *bladder fucus*, common *sea-wrack*, or *sea-ware*. It grows in great abundance on the sea-rocks about low-water mark; producing its fructifications in July and August. It has the same habit, colour, and substance as the foregoing; but differs from it in the following respects: The edges of the leaf have no serratures, but are quite entire. In the disc or surface are immersed hollow, spherical, or oval air-bladders, hairy within, growing generally in pairs, but often single in the angles of the branches, which are most probably air-bladders destined to buoy up the plant in the water. Lastly, on the summits or

extreme segments of the leaves, appear tumid vesicles about three quarters of an inch long, sometimes oval and in pairs, sometimes single and bifid, with a clear viscid mucus interspersed with downy hairs.—This species is an excellent manure for land; for which purpose it is often applied in the maritime parts of Scotland and other countries. In the islands of Jura and Skye it frequently serves as a winter-food for cattle, which regularly come down to the shores at the recesses of the tides to seek for it. And sometimes even the fags have been observed, after a storm, to descend from the mountains to the sea-sides to feed upon this plant.

Linnæus informs us, that the inhabitants of Gothland in Sweden boil this *fucus* in water, and mixing therewith a little coarse meal or flour, feed their hogs with it; for which reason they call the plant *fwintang*. And in Scania, he says, the poor people cover their cottages with it, and sometimes use it for fuel.

In Jura, and some other of the Hebrides, the inhabitants dry their cheeses without salt, by covering them with the ashes of this plant; which abounds with such quantity of salts, that from five ounces of the ashes may be procured two ounces and a half of fixed alkaline salts, that is, half of their whole weight.

But the most beneficial use to which the *fucus vesiculosus* is applied, in the way of economy, is in making pot-ash or kelp, a work much practised in the Western Isles. There is great difference in the goodness and price of this commodity, and much care and skill required in properly making it. That is esteemed the best which is hardest, finest grain'd, and free from sand or earth. The price of kelp in Jura is 3*l.* 10*s.* per ton, and about 40 or 50 tons are exported annually from that island. So great a value is set upon this *fucus* by the inhabitants of that place, that they have sometimes thought it worth their while to roll fragments of rocks and huge stones into the sea, in order to invite the growth of it.

Its virtues in the medical way have been much celebrated by Dr Russel, in his Dissertation concerning the use of Sea-water in the Diseases of the Glands. He found the saponaceous liquor or mucus in the vesicles of this plant to be an excellent resolvent, extremely serviceable in dispersing all scorbutic and scrophulous swellings of the glands. He recommends the patient to rub the tumor with these vesicles bruised in his hand, till the mucus has thoroughly penetrated the part, and afterwards to wash with sea-water. Or otherwise, to gather two pounds of the tumid vesicles, in the month of July, when they are full of mucus, and infuse them in a quart of sea-water, in a glass-vessel, for the space of 15 days, when the liquor will have acquired nearly the consistence of honey. Then strain it off through a linen cloth, and rub this liquor with the hand, as before, three or four times a-day, upon any hard or scrophulous swellings, washing the parts afterwards with sea-water, and nothing can be more efficacious to disperse them. Even scirrhoties, he says, in womens breasts, have been dispelled by this treatment. The same author, by calcining the plant in the open air, made a very black salt powder, which he called *vegetable athiops*; a medicine much in use as a resolvent and deobstruent, and recommended

Fucus.

Fucus.

also as an excellent dentrifice, to correct the scorbutic laxity of the gums, and take off the foulness of the teeth.

3. The plicatus, matted or Indian-grass *fucus*, grows on the sea-shores in many places both of Scotland and England. It is generally about three or four, but sometimes six, inches long. Its colour, after being exposed to the sun and air, is yellowish, or auburn; its substance pellucid, tough, and horny, so as to bear a strong resemblance to what the anglers call *Indian grass*, that is, the tendrils issuing from the ovary of the dog-fish.

4. The palmatus, palmated or sweet fucus, commonly called *dulse* or *dilse*. This grows plentifully on the sea-coasts of Scotland, and the adjoining islands. Its substance is membranaceous, thin, and pellucid; the colour red, sometimes green with a little mixture of red; its length generally about five or six inches, but varies from three inches to a foot; its manner of growth fan-shaped, or gradually dilated from the base upwards. Its divisions are extremely various. The inhabitants both of Scotland and England take pleasure in eating this plant, without expecting any medical virtues from it. The inhabitants of the Archipelago also are fond of it, as we learn from Steller. They sometimes eat it raw, but esteem it most when added to ragouts, omelettes, &c. to which it gives a red colour; and, dissolving, renders them thick and gelatinous. In the Isle of Skye it is sometimes used in fevers to promote a sweat, being boiled in water with the addition of a little butter. In this manner it also frequently purges. The dried leaves, infused in water, exhale the scent of violets.

5. The esculentus, eatable fucus, or bladder-locks, commonly called *tangle* in Scotland, is likewise a native of the British shores. It is commonly about four feet long, and seven or eight inches wide; but is sometimes found three yards or more in length, and a foot in width. Small specimens are not above a cubit long, and two inches broad. The substance is thin, membranaceous, and pellucid; the colour green or olive. The root consists of tough cartilaginous fibres. The stalk is about six inches long and half an inch wide, nearly square, and pinnated in the middle between the root and origin of the leaf, with ten or a dozen pair of thick, cartilaginous, oval-obtuse, foliaceous ligaments, each about two inches long, and crowded together. The leaf is of an oval-lanceolate, or long elliptic form, simple and undivided, waved on the edges, and widely ribbed in the middle from bottom to top, the stalk running through its whole length, and standing out on both sides of the leaf. This fucus is eaten in the north both by men and cattle. Its proper season is in the month of September, when it is in greatest perfection. The membranous part is rejected, and the stalk only is eaten. It is recommended in the disorder called *pica*, to strengthen the stomach and restore the appetite.

6. The saccharinus, sweet fucus, or sea-belt, is very common on the sea-coast. The substance of this is cartilaginous and leathern; and the leaf is quite ribless. By these characters it is distinguished from the preceding, to which it is nearly allied. It consists only of one simple, linear, elliptic leaf, of a tawney green colour, about five feet long and three inches wide in its full-grown state; but varies so exceedingly as to be found from a foot to four yards in length. The

ordinary length of the stalk is two inches, but it varies even to a foot. The root is composed of branched fibres, which adhere to the stones like claws. This plant is often infested with the *fertularia ciliata*. The inhabitants of Iceland make a kind of pottage of this fucus; boiling it in milk, and eating it with a spoon. They also soak it in fresh water, dry it in the sun, and then lay it up in wooden vessels, where in a short time it is covered with a white efflorescence of sea-salt, which has a sweet taste like sugar. This they eat with butter; but if taken in too great a quantity, the salt is apt to irritate the bowels and bring on a purging. Their cattle feed and get fat upon this plant, both in its recent and dry state; but their flesh acquires a bad flavour. It is sometimes eaten by the common people on the coast of England, being boiled as a pot-herb.

7. The ciliatus, ciliated or ligulated fucus, is found on the shores of Iona and other places, but is not common. The colour of this is red, the substance membranous and pellucid, without rib or nerve; the ordinary height of the whole plant about four or five inches. It is variable in its appearance, according to the different stages of its growth. This fucus is eaten by the Scots and Irish promiscuously with the *fucus palmatus* or *dilse*.

8. The prolifer, or proliferous fucus, is found on the shores of the western coast, adhering to shells and stones. The colour is red; the substance membranaceous, but tough, and somewhat cartilaginous, without rib or nerve, though thicker in the middle than at the edges. The whole length of the plant is about four or five inches, the breadth of each leaf about a quarter of an inch. The growth of this fucus, when examined with attention, appears to be extremely singular and wonderful. It takes its origin either from a simple, entire, narrow, elliptic leaf, about an inch and a half long; or from a dilated forked one, of the same length. Near the extremity of the elliptic leaf, or the points of the forked one (but out of the surface, and not the edge), arises one or more elliptic or forked leaves, which produce other similar ones, in the same manner, near the summits; and so on continually one or more leaves from near the ends of each other, in a proliferous and dichotomous order, to the top of the plant; which in the manner of its growth resembles in a good measure the cactus opuntia, or flat-leaved Indian fig. Sometimes two or three leaves, or more, grow out of the middle of the disc of another leaf; but this is not the common order of their growth. The fructifications are red, spherical, rough warts, less than the smallest pin's head, scattered without order on the surface of the leaves. These warts, when highly magnified, appear to be the curled rudiments of young leaves; which in due time either drop off and form new plants, or continue on and germinate upon the parent. This plant is very much infested with the *suatra pilosa*, the *mandrepora verrucaria*, and other corallines, which make it appear as if covered with white scabs.

9. The pinnatifidus, jagged fucus, or pepper-dilse, is frequent on sea-rocks which are covered by the tides, both on the eastern and western coasts. It is of a yellow olive-colour, often tinged with red. The substance is cartilaginous, but yet tender and transparent; the height about two or three inches. This fu-

Fucus.

cus

Fucus. *cus* has a hot taste in the mouth, and is therefore called *pepper-dill* by the people in Scotland, who frequently eat it as a salad in the same manner they do the *fucus palmatus*.

10. The *plocamium*, or pectinated *fucus*, is frequent on the sea-rocks, and in basins of water left by the recesses of the tides. Its natural colour is a most beautiful bright red or purple, but is often variegated with white or yellow. Its substance is cartilaginous, but extremely thin, delicate, and transparent; its height commonly about three or four inches. The stalk is compressed, about half a line in diameter, erect, but waved in its growth, and divided almost from the base into many widely expanded branches. These primary branches are very long, alternate, exactly like the stalk, and subdivided into alternate secondary branches, which are again frequently compounded in like manner, and these divisions decorated with subulated teeth growing in alternate rows, curiously pectinated or finely toothed on the upper side like a comb, the smallest of these teeth scarcely visible to the naked eye. The fructifications are minute spherical capsules, or smooth dark-red globules, scattered without order on the sides of the branches; generally sessile, but some few of them supported on short peduncles. This *fucus*, on account of its elegant colours and fine divisions, is the species most admired by the ladies who are fond of pictures and mimic landscapes composed of marine vegetables.

11. The *filum*, thread-*fucus*, or sea-laces, is found on the sea-rocks, and waving under the water like long strings, frequent on many parts of the coast. The substance of this is opaque and cartilaginous, but not difficult to be broken. The colour, when recent, a dull olive-green; when dry, fuscous, or nearly black; and when exposed for some time on the shores to the sun and air, it becomes yellow, straw-coloured, or white. It consists only of a simple, unbranched, naked, cylindrical stalk, three or four yards long, more or less, from the size of a large fiddle-string to that of a thick whip-cord; smallest at the base and summit; smooth on the outside, full of mucus within; often twisted, and always intercepted by numerous transverse diaphragms, visible when the plant is held between the eye and the light. The fructifications have not yet been discovered; but from the transverse septa in its structure, it is reasonable to suppose this plant to belong rather to the genus of *conserva* than that of *fucus*. The stalks, skinned when half dry and twisted, acquire so considerable a degree of strength and toughness, that we are informed the Highlanders sometimes use them for the same intentions as Indian grass.

12. The *giganteus*, or gigantic *fucus*, is a native of the Straits Le Maire; and grows on rocky ground, which in those countries is distinguished from sand or ooze by the enormous length of the sea-weeds that grow upon it. The leaves are four feet long, and some of the stalks, though not thicker than a man's thumb, are 120. Sir Joseph Banks and Dr Solander founded over some of them which were 84 feet long; and as they made a very acute angle with the bottom, they were thought to be at least one half longer.

FUEGO, or **Fogo**, one of the Cape de Verd islands, in the Atlantic ocean. It is much higher than any of the rest; and seems, at sea, to be one single mountain,

though on the sides there are deep valleys. There is a volcano at the top, which burns continually, and may be seen a great way off at sea. It vomits a great deal of fire and smoke, and throws out huge pieces of rock to a vast height; and sometimes torrents of melted matter run down the sides. The Portuguese, who first inhabited it, brought negro slaves with them, and a flock of cows, horses, and hogs; but the chief inhabitants now are blacks, of the Romish religion. W. Long. 24. 47. N. Lat. 15. 20.

FUEL, whatever is proper to burn or make a fire; as wood, turf, peat, bituminous earths, coal, &c.

FUEN-HOA, a city of China, in the province of **PE-TCHELI**, celebrated for its extent and the number of its inhabitants, as well as for the beauty of its streets and triumphal arches. It is situated near the great wall, amidst mountains; and has under its jurisdiction, besides two cities of the second and eight of the third class, a great number of fortresses, which bar the entrance of China against the Tartars.

FUGALIA, in Roman antiquity, a feast supposed by some to be the same with the *refugium*, held on the 24th of February, in memory of the expulsion of the kings and the abolishing of monarchical government. Others again distinguish the *fugalia* from the *refuge*. And others think, that the *fugalia* was the same with the *poplifugia*, or the feast of *Fugia*, the goddess of joy, occasioned by the rout of an enemy, which was the reason the people abandoned themselves to riot and debauchery.

FUGITIVE, a person obliged to fly his country, or remove from a place where he had some abode or establishment, on account of his crimes, debts, or other occasions.

FUGITIVE Pieces, among the learned, denote those little compositions which are printed on loose sheets or half sheets; thus called, because easily lost and soon forgot.

FUGUE, in music, (from the Latin *fuga*, "a chase:") A piece of music, sometimes longer and sometimes shorter, in which, agreeable to the rules of harmony and modulation, the composer treats a subject; or, in other words, what expresses the capital thought or sentiment of the piece, in causing it to pass successively and alternately from one part to another.

These are the principal rules of the fugue; of which some are peculiar to itself, and others common to it with what the French call *imitation*.

1. The subject proceeds from the tonic to the dominant, or from the dominant to the tonic, in rising or descending.

2. Every fugue finds its response in the part immediately following that which commenced.

3. That response ought to resume the subject in the interval of a fourth or fifth above or below the key, and to pursue it as exactly as the laws of harmony will admit; proceeding from the dominant to the tonic when the subject is introduced from the tonic to the dominant, and moving in a contrary direction when the subject is introduced from the dominant to the tonic. One part may likewise resume the same subject in the octave or unison of the preceding; but in that case, it is a repetition rather than a real response.

4. As the octave is divided into two unequal parts, of which the one contains four gradations ascending from the tonic to the dominant, and the other only

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three in continuing the ascent from the dominant to the tonic; this renders it necessary to have some regard to this change in the expression of the subject, and to make some alterations in the response, that we may not quit the chords that are essential to the mode. It is a different case when the composer intends to alter the modulation; for there the exactness of the response itself, when taken in a different tone, produces the alteration proper for this change.

5. It is necessary that the fugue should be planned in such a manner, that the response may commence before the close of the first air, so that both the one and the other may be in part heard at the same time; that, by this anticipation, the subject may be as it were connected with itself, and that the art of the composer may discover itself in this concourse. It is absolute mockery, instead of a fugue, to impose upon the hearers the same air, merely transposed from one key to another, without any other restraint than an accompaniment afterwards formed at pleasure. This deserves at best no better name than what the French call *imitation*. See IMITATION.

Besides these rules, which are fundamental, there are others which, though prescribed by taste alone, are not less essential. Fugues, in general, render music more noisy than agreeable; it is for this reason that they are more agreeable in the chorus than any where else. Now, as their chief merit consists in fixing the ear on the principal air or subject, which for this reason is made to pass incessantly from part to part, and from mode to mode, the composer ought to exert his care in preserving that air always distinct; or to prevent it from being absorbed in, or confounded with, the other parts. To produce this effect, there are two different ways: one in the movement, which must be incessantly contrasted with itself; so that, if the procedure of the fugue be accelerated, the other parts more gravely and with protracted notes; or, on the contrary, if the motion of the fugue be slow and solemn, the accompaniments must have more and quicker business. The other method is to extend the harmony, by removing the parts at a greater distance one from the other; lest the others, too nearly approximated to that which contains the subject, should be confounded with it, and prevent it from being distinguished with sufficient clearness; so that what would be an imperfection any where else, becomes here a beauty.

The unity of melody should be preserved: this is the great and general rule, which must frequently be practised by different means. The chords must be chosen, and the intervals, so that one particular sound may produce the chief effect: this can only result from the unity of the melody. It will sometimes be necessary to employ voices and instruments of different kinds, that the part which ought to prevail may be most easily distinguished: this again shows the necessity of preserving the unity of the melody. Another object of attention, no less necessary, is, in the different connections of modulation which are introduced by the procedure and progress of the fugue, to cause all these modulations to correspond at the same time in all the parts, to connect the whole in its progress by an exact conformity of modes; lest, if one part be in one mode, and another in another, the general harmony should be in none at all, and for that reason should no longer be

able to produce simple effects upon the ear, nor simple ideas in the mind; which is another reason for preserving unity of melody. In a word, in every fugue the confusion of melodies and modulations is at once what a composer has most to fear, and will find the greatest difficulty in avoiding; and as this kind of music never produces a pleasure above mediocrity, one may say that a fine fugue is, though the masterpiece of an excellent harmonist, ungrateful to his toil.

There are still several other kinds of fugues; such as the perpetual fugue*, the double fugue, the inverted * See Canon fugue.

The inverted fugue is a manner of composition, in which the flying part proceeds in a contrary direction to the other fugue, which had been formerly fixed in the same piece of music. Thus, when the first fugitive part is heard in ascending from the tonic to the dominant, or from the dominant to the tonic, the counter fugue ought to be heard in descending from the dominant to the tonic, or from the tonic to the dominant, and *vice versa*. Its other rules are exactly like those of the common fugue.

FULCRUM, in mechanics, the prop or support by which a lever is sustained.

FULDE, a considerable town of Germany, in the circle of the upper Rhine, and in the Buchow, with a celebrated abbey; whose abbot is primate of the abbey of the empire, perpetual chancellor of the emperor, and sovereign of a small territory lying between Hesse, Franconia, and Thuringia. It is seated on the river Fulde, 55 miles south of Cassel, and 58 north-east of Francfort. E. Long. 9. 53. N. Lat. 50. 40.

FULGORA, in zoology, a genus of insects belonging to the order of hemiptera; the characters of which are these: The front, or fore-part of the head, is drawn extended and empty; the antennæ are seated below the eyes, having two articulations, whereof the exterior is larger, and of a globular form; the rostrum is inflected, or bent inwards under the body; and the feet are made for walking. There are nine species, the most remarkable of which is the candelaria, or lantern-fly. The head and thorax are generally of a ruddy brown; and the ground colour of the elytra is fresh green, but quaintly figured with spots of a yellowish clay colour, sometimes pale, at other seasons of a deeper hue. The wings are of a deep and beautiful yellow, with a broad band of glossy black bordering the extremities. The tarsi of the feet are composed of three articulations, and are of a paler colour than the legs and thighs, which are brown. When the insect is on the wing, the waving of the elytra (whose thinness renders the spots thereon transparent), assisted by the luminous quality peculiar to the tribe, and the golden yellow of the under wings, bordered with black, occasion, in Mr Barbut's opinion, the flashes they dart around in the night, and create images beyond probability in the minds of persons too ready to credit hyperboles. It is an inhabitant of China.

FULHAM, a village of Middlesex, four miles from London. The Danes in 869 wintered at this place till they retired to the continent. It was in the Conqueror's time held of the king by the canons of St Paul's; and there is an ancient house here, which is moated about, and belongs to the see of London, whose bishop has a palace here, and the demesne has belong-

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ed to that diocese from 1067. From this place to Putney there is a wooden bridge over the Thames, where not only horses, coaches, and all carriages, but even foot-passengers, pay toll. The church here is both a rectory and a vicarage.

FULICA, the **GALLINULE** and **COOT**, in ornithology; a genus of birds of the order of grallæ. It has a convex bill, with the upper mandible fornicated over the lower at the edge; the lower mandible is gibbous behind the tip. The forehead is bald; and the feet have four toes, subpinnated. There are 25 species; 18 of which belong to the gallinule division, distinguished by having the toes furnished with broad scalloped membranes; and 7 comprehend the coots which have the toes divided to their origin. The following species are among the most noted.

1. The *chloropus*, or **COMMON GALLINULE**, is in length about 14 inches, and has a bald forehead and broad flat toes. It gets its food on grassy banks, and borders near fresh waters, and in the very waters if they be weedy. It builds upon low trees and shrubs by the water-side; breeding twice or thrice in a summer; and, when the young are grown up, drives them away to shift for themselves. They lay seven eggs of a dirty white, thinly spotted with rust-colour. This bird strikes with its bill like a hen, and in the spring has a shrill call. In flying, it hangs down its legs; in running, it often flirts up its tail, and shows the white feathers. We may observe, that the bottoms of its toes are so very flat and broad (to enable it to swim), that it seems to be the bird which connects the cloven-footed aquatics with the next tribe, *viz.* the fin-toed. It is pretty common on the continent, though in some parts more scarce than in others. It is also an inhabitant of America, from New York to Carolina; and is recorded as a native of Jamaica and other islands in the West Indies. It is said to feed on plants and small fish; and the flesh is for the most part pretty good.

2. The *porphyrio*, or **PURPLE GALLINULE**, is about the size of a fowl, or 17 inches in length. The bill is an inch and a half long, and of a deep red colour. The forehead is bare and red; the head and hind part of the neck are glossy violet; the legs are very stout, and of the colour of the bill. This bird is more or less common in all the warmer parts of the globe. On the coasts of Barbary they abound, as well as in some of the islands of the Mediterranean. In Sicily they are bred in plenty, and kept for their beauty; but whether indigenous there, is uncertain. It is frequently met with in various parts of the south of Russia and western parts of Siberia, among reedy places; in the neighbourhood of the Caspian Sea it is not uncommon; but in the cultivated rice-grounds of Ghilar in Persia it is in great plenty and high plumage. The female makes the nest among the reeds in the middle of March; lays three or four eggs, and sits from three to four weeks. That it is common in China, the paper-hangings from thence will every where testify. It is also met with in the East Indies, the islands of Java, Madagascar, and many others. Our late navigators saw them at Tongataboo in vast numbers, as well as in the island of Tanna and other parts. It is also common in the southern parts of America. In respect to its manners, it is a very docile bird, being easily tamed, and feeding with the poul-

try, scratching the ground with the foot as the cock and hen. It will feed on many things, such as fruit, roots of plants, and grain; but will eat fish with avidity, dipping them into the water before it swallows them. It will frequently stand on one leg, and lift the food to its mouth with the other like a parrot. A pair of these kept in an aviary in France, made a nest of small sticks mixed with a quantity of straw, and laid six white eggs, perfectly round; but the hen was careless of them, and they came to nothing. The flesh is said to be exquisite in taste.

3. The *atra*, or **COMMON COOT**, hath a bald forehead, a black body, and lobated toes; and is about 15 inches in length. They frequent lakes and still rivers; making their nest among the rushes, with grass, reeds, &c. floating on the water, so as to rise and fall with it. They lay five or six large eggs, of a dirty whitish hue, sprinkled over with minute deep rust-coloured spots; and it is said, that sometimes they will lay 14 or more eggs. The young when just hatched are very deformed, and the head mixed with a red coarse down. In winter they often repair to the sea, and the channel near Southampton is sometimes observed almost covered with them. They are often brought to that market, where they are exposed to sale without their feathers, and scalded like pigs. This species is not so numerous as might be expected; for we find that vast numbers fall a prey while young to the buzzards, which frequent the marshes. Their food is small fish and water-insects; but they will sometimes eat the roots of the bulrush, and with it feed the young; they are said likewise to eat grain. This species is supposed to extend throughout the old continent, and perhaps the new also. Authors record it as inhabiting Greenland, Sweden, Norway, Russia, Siberia, Persia, and China, and many of the intermediate parts. It is also met with in Jamaica, Carolina, and other parts of North America. The Indians about Niagara dress the skins of these birds, and use them for pouches. They are called in Carolina *flusterers*.

4. The *aterrima*, or **GREATER COOT**, is of a larger size than the last, and its plumage is blacker. This species is said to be found in Lancashire and Scotland; but is more plentiful on the continent, being found in Russia and the western part of Siberia very common; and is also in plenty at Sologne and the neighbouring parts, where they call it *judelle*. The people eat this bird on maigre days, and its flesh is much esteemed.

FULIGINOUS, whatever proceeds from a thick sooty smoke, such as litharge and lamp-black.

FULIGNO, a city of Italy, in the pope's territories; 10 miles north of Spoleto.

FULIGO, in natural history, a species of pumice-stone. See **PUMICE**.

FULK (William), a learned and eminent divine of the church of England, in the 16th century. He was patronised by the earl of Leicester, who in 1571 presented him to the living of Warley in Essex, and soon after to that of Diddington in Suffolk. He attended Leicester, when he went ambassador to France; and on his return was made master of Pembroke-hall, and Margaret professor of divinity at Cambridge. His works are very numerous, levelled chiefly at the Papists; the most considerable of them is his Comment on the Rhemish Testament. He died in 1589.

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FULLER (Nicholas), prebendary of Salisbury, and a learned English critic; who published in 1617 *Miscellanea Theologica* in four books, and afterward two more of *Miscellanea Sacra*. He died in 1623; and there are some MSS of his remaining in the Bodleian library that show his great skill in Hebrew and philology.

FULLER (Dr Thomas), a learned English divine, was born at Alvinckle, near Oundle, in Northamptonshire, about the year 1608, and studied at Cambridge. He was chosen minister of St Bennet's there; and at about 23 years of age, his merit procured him a fellowship in Sidney-college, and a prebend in Salisbury cathedral. He was soon after presented to the rectory of Broad Windfor in Dorsetshire; and afterwards was made lecturer of the Savoy in London: but upon the pressing of the covenant, he retired to Oxford; and soon after accompanied Sir Ralph Hopton as his chaplain in the army, which he attended in their marches from place to place. After the death of king Charles I. he obtained the living of Waltham-abbey, and was appointed lecturer of St Clement's; and shortly after removed to the lecture of St Bride's, Fleet-street. Upon the restoration, he recovered his prebend in the cathedral of Salisbury, was appointed chaplain extraordinary to his majesty, and created doctor of divinity. It is said, his memory was so amazingly tenacious and comprehensive, that he could make use of a sermon *verbatim* if he once heard it. He once undertook, in passing to and from Temple-bar to the Poultry, to tell at his return every sign as it stood in order on both sides of the way, repeating them either backwards or forwards; and this task he actually performed. He wrote, 1. A History of the Holy War. 2. The Church-history of Britain, in folio. 3. Andronicus, or the Unfortunate Politician, in 8vo. 4. A Pisgah-sight of Palestine. 5. A History of English Worthies; and other works. He died in August 1661; and was interred in the chancel of Cranford church, in Middlesex, whither his body was attended by at least 200 of his brethren of the ministry.

FULLER, a workman employed in the woollen manufactories to mill or scour cloths, serges, and other stuffs, in order to render them more thick, compact, and durable. See FULLING.

* See Clay,
n^o 4.

FULLER'S Earth, in natural history, a species of clay*, of a greyish ash-coloured brown, in all degrees from very pale to almost black, and it has generally something of a greenish cast. It is very hard and firm, of a compact texture, of a rough and somewhat dusty surface that adheres slightly to the tongue. It is very soft to the touch, not staining the hands, nor breaking easily between the fingers. It has a little harshness between the teeth, and melts freely in the mouth. Thrown into water, it makes no ebullition or hissing; but swells gradually in bulk, and falls into a fine soft powder. It makes no effervescence with aquafortis.

The greatest quantity and the finest earth of this kind in the world, is dug in the pits at Wavedon, near Woburn in Bedfordshire. The strata in these pits lie thus: From the surface to the depth of six feet, there are several layers or beds of sand, all reddish, but some lighter coloured than others. Under these there is a thin stratum of a sand-stone, which they break through, and then there is the fuller's earth. The upper stratum of this is about a foot thick: the workmen call

it *cledge*, and throw it aside as useless; being commonly fouled with the sand which originally covered it, and which insinuates itself a good way into it. After this, they come to the fine fuller's earth for sale, which lies to the depth of eight feet more. The matter of this is divided into several layers, there being commonly about a foot and an half between one horizontal fissure and another. Of these several layers, the upper half, where the earth breaks itself, is tinged red; which seems to be owing to the running of the water upon it from among the sands above; some of which are probably of a ferruginous nature, or have ferruginous matter among them. This reddish fuller's earth the workmen call *crop*; and between the cledge and this there is a thin stratum of matter, of less than an inch, which in taste, colour, and external appearance, resembles the terra Japonica of the shops. The lower half of the strata of fuller's earth they call *wall-earth*. This is untinged with the red colour of the other, and seems the most proper for fulling. Under the fuller's earth there is a stratum of white and coarse stone about two feet thick. They seldom dig thro' this; but if they do, they find more strata of sand.

This earth is of great use in scouring cloths, stuffs, &c. imbibing all the grease and oil used in preparing, dressing, &c. of the wool; for which reason it is made a contraband commodity, and is not to be exported under the penalty of 1s. for every pound weight. See FULLING.

FULLER'S Weed, or Teazle. See DIPsACUS.

FULLERY, a place where cloths, &c. are full'd. See the next article.

FULLING, the art or act of cleansing, scouring, and pressing cloths, stuffs, and stockings, to render them stronger, closer, and firmer: called also *milling*. Pliny (*lib. vii. cap. 56.*) assures, that one Nicias, the son of Hermias, was the first inventor of the art of fulling: and it appears by an inscription, quoted by Sir G. Wheeler, in his *Travels thro' Greece*, that this same Nicias was a governor in Greece in the time of the Romans.

The fulling of cloths and other stuffs is performed by a kind of water-mill, thence called a *fulling* or *scouring mill*.

These mills, excepting in what relates to the mill-stones and hopper, are much the same with corn-mills: and there are even some which serve indifferently for either use; corn being ground, and cloths full'd, by the motion of the same wheel. Whence, in some places, particularly in France, the fullers are called *millers*; as grinding corn and milling stuffs at the same time.

The principal parts of the fulling-mill are, The wheel, with its trundle; which gives motion to the tree or spindle, whose teeth communicate it to the pestles or stampers, which are hereby raised and made to fall alternately according as its teeth catch on or quit a kind of latch in the middle of each pestle. The pestles and troughs are of wood; each trough having at least two, sometimes three pestles, at the discretion of the matter, or according to the force of the stream of water. In these troughs are laid the cloths, stuffs, &c. intended to be full'd: then, letting the current of water fall on the wheel, the pestles are successively let fall thereon, and by their weight and velocity stamp and press the stuffs very strongly, which by this means become thickened and condensed. In the course of the

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Fulling.

Ful-ling
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the operation, they sometimes make use of urine, sometimes of fuller's earth, and sometimes of soap. To prepare the stuffs to receive the first impressions of the peltle, they are usually laid in urine; then in fuller's earth and water; and, lastly, in soap dissolved in hot water. Soap alone would do very well; but this is expensive: though fuller's earth, in the way of our dressing, is scarce inferior thereto; but then it must be well cleared of all stones and grittinesses, which are apt to make holes in the stuff. As to urine, it is certainly prejudicial, and ought to be entirely discarded; not so much on account of its ill smell, as of its sharpness and saltness, which qualities are apt to render the stuffs dry and harsh.

The true method of fulling with soap is delivered by Monsr. Colinet, in an authentic memoir on that subject, supported by experiments made by order of the marquis de Louvois, then superintendent of the arts and manufactories of France; the substance of which we shall her subjoin.

Method of FULLING Cloths and Woollen Stuffs with Soap.

—A coloured cloth, of about 45 ells, is to be laid in the usual manner in the trough of a fulling-mill; without first soaking it in water, as is commonly practised in many places. To full this trough of cloth, 15 pounds of soap are required; one-half of which is to be melted in two pails of river or spring water, made as hot as the hand can well bear it. This solution is to be poured by little and little upon the cloth, in proportion as it is laid in the trough: and thus it is to be fulled for at least two hours; after which, it is to be taken out and stretched. This done, the cloth is immediately returned into the same trough, without any new soap, and there fulled two hours more. Then taking it out, they wring it well, to express all the grease and filth. After the second fulling, the remainder of the soap is dissolved as in the former, and cast four different times on the cloth; remembering to take out the cloth every two hours, to stretch it, and undo the plaits and wrinkles it has acquired in the trough. When they perceive it sufficiently fulled, and brought to the quality and thickness required, they scour it for good in hot water, keeping it in the trough till it be quite clean. As to white cloths; in regard these full more easily and in less time than coloured ones, a third part of the soap may be spared.

FULLING of Stockings, Caps, &c. should be performed somewhat differently; viz. either with the feet or the hands; or a kind of rack, or wooden machine, either armed with teeth of the same matter, or else horses or bullocks teeth. The ingredients made use of herein are, urine, green soap, white soap, and fuller's earth. But the urine also is reckoned prejudicial here. Woven stockings, &c. should be fulled with soap alone: for those that are knit, earth may be used with the soap. Indeed it is frequent to full these kinds of works with the mill, after the usual manner of cloth, &c. But that is too coarse and violent a manner, and apt to damage the work unless it be very strong.

FULMAR, in ornithology. See **PROCELLARIA**.

FULMAR, or *Foumart*. See **MUSTELA**.

FULMINATING, something that thunders or resembles thunder.

FULMINATING Gold, Silver, Copper, Quicksilver, &c. See **CHEMISTRY**. Index at *Fulminating*.

FULMINATION, in chemistry, the same with detonation. See **DETONATION** and **NITRE**.

FULMINATION, in the Romish canon law, a sentence of a bishop, official, or other ecclesiastic appointed by the pope, by which it is decreed that some bull sent from the pope shall be executed.

FUMARIA, **FUMITORY**: A genus of the pentandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 24th order, *Corydales*. The calyx is diphyllous; the corolla ringent; and there are two membranaceous filaments, each of which has three antheræ. There are a number of different species; all of them low, shrubby, and deciduous and evergreen plants, growing from two to six or seven feet high, adorned with small simple leaves, and papilionaceous flowers of different colours. The most remarkable is the officinalis, or common fumitory; which grows naturally in shady cultivated grounds, and produces spikes of purplish flowers in May and June. It is very juicy, of a bitter taste, without any remarkable smell.—The medical effects of this herb are, to strengthen the tone of the bowels, gently loosen the belly, and promote the urinary and other natural secretions. It is principally recommended in melancholic, scorbutic, and cutaneous disorders, for opening obstructions of the viscera, attenuating and promoting the evacuation of viscid juices. Frederic Hoffman had a very great opinion of it as a purifier of the blood; and assures us, that in this intention scarce any plant exceeds it. Cows and sheep eat the plant; goats are not fond of it; horses and swine refuse it.

FUMIGATION, in chemistry, a kind of calcination, when metals or other hard bodies are corroded or softened by receiving certain fumes for that purpose.

FUMIGATION, in medicine. By the subtle fumes that are inspired as well as inhaled into our bodies, much benefit or prejudice is produced, according to the nature of the matter, and the constitution into which it is received; as is evident from the palsies produced among workers in lead-mines, &c. and the benefits received in many cases when the air is impregnated with salutary materials. Catarrhs and catarrhus coughs are relieved by fumes received with the breath; and, by the same method, expectoration is assisted in humoral asthmas; and even ulcers in the lungs are said to have been healed by this method. The advantage of mercurial fumigations in the cure of venereal ulcers is known to every practitioner.

FUMITORY, in botany. See **FUMARIA**.

FUNAMBULUS, among the Romans, was what we call a *rope-dancer*, and the Greeks *schanobates*. See **ROPE-DANCER**.

There was a funambulus, it seems, who performed at the time when the Hecyra of Terence was acted; and the poet complains, that the spectacle prevented the people from attending to his comedy. *Ita populus studio stupidus in funambulo, animum occuparat.*

At Rome, the funambuli first appeared under the consulate of Salpicius Paticus and Licinius Stolo, who were the first introducers of the scenic representations. It is added, that they were first exhibited in the island of the Tyber, and that the censors Messala and Cassius afterwards promoted them to the theatre.

In the *Floralia*, or *ludi Florales*, held under Galba, there

Fulmina-
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Funambu-
lus.

Funchal
Fund.

there were funambulatory elephants, as we are informed by Suetonius. Nero also showed the like, in honour of his mother Agrippina. Vopiscus relates the same of the time of Carinus and Numerianus.

FUNCHAL, an episcopal town of Madeira, in an island of the Atlantic Ocean, over-against the coast of Morocco. It is large, strong, handsome, and populous, with fine churches. The principal trade consists in sweetmeats and wines. It belongs to the Portuguese; and is seated in a fertile valley, at the foot of a mountain from whence several streams proceed. W. Long. 14. 30. N. Lat. 31. 30.

FUNCTION, the act of fulfilling the duties of any employment.

FUNCTION, being also applied to the actions of the body, is by physicians divided into vital, animal, and natural. The *vital* functions are those necessary to life, and without which the individual cannot subsist; as the motion of the heart, lungs, &c. The *natural* functions are such as it cannot subsist any considerable time without; as the digestion of the aliment, and its conversion into blood. Under *animal* functions are included the senses of touching, tasting, &c. memory, judgment, and voluntary motion; without any or all of which an animal may live, but not very comfortably.

The animal-functions perform the motion of the body by the action of the muscles; and this action consists chiefly in the shortening the fleshy fibres, which is called *contraction*, the principal agents of which are the arteries and nerves distributed in the fleshy fibres.

All parts of the body have their own functions, or actions, peculiar to themselves. Life consists in the exercise of these functions, and health in the free and ready exercise of them.

FUND, in general, signifies any sum of money appropriated for a particular purpose. Thus, that part of the national revenue which is set aside for the payment of the national debt, is called the *sinking fund*. But, when we speak of *the funds*, we generally mean the large sums which have been lent to government, and constitute the national debt; and for which the lenders, or their assignees, receive interest from revenues allotted for that purpose. The term *stock* is used in the same sense, and is also applied to the sums which form the capital of the bank of England, the East India and South-Sea companies; the proprietors of which are intitled to a share of the profits of the respective companies.

The practice of funding was introduced by the Venetians and Genoese in the 16th century, and has been adopted since by most of the nations in Europe. Princes had often borrowed money, in former times, to supply their exigencies, and sometimes mortgaged their territories in security: but these loans were generally extorted, and their payment was always precarious; for it depended on the good faith and success of the borrower, and never became a regular burden on posterity. The origin of funds is derived from the peculiar manners and circumstances of modern Europe. Since the invention of gun-powder, and the progress of commerce, the military occupation has become a distinct employment in the hands of mercenaries; the apparatus of war is attended with more expence; and

N^o 133.

Fund.

the decision of national quarrels has often been determined by command of money rather than by national bravery. Ambitious princes have therefore borrowed money, in order to carry on their projects with more vigour. Weaker states have been compelled, in self-defence, to apply to the same resource; the wealth introduced by commerce has afforded the means; the regularity of administration, established in consequence of the progress of civility, has increased the confidence of individuals in the public security; the complicated system of modern policy has extended the scenes of war, and prolonged their duration; and the colonies established by the mercantile nations have rendered them vulnerable in more points, and increased the expence of defending them.

When a greater sum has been required for the annual expence than could easily be supplied by annual taxes, the government have proposed terms, to their own subjects, or foreigners, for obtaining an advance of money, by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period, or perpetual. If the sum allotted annually for the benefit of those who advance the money, be considerably greater than the interests of the sums advanced, they may agree to accept of such allowance, for a limited time, as a full equivalent. Thus, they may either agree for the casual produce of the revenue assigned; or a fixed annuity for a greater or less number of years; or a life-annuity to themselves or nominees; or an annuity for two or more lives; or an annuity, with the benefit of survivorship, called a *tontine*, in which scheme, the whole sum to which the original annuitants were intitled continues to be distributed among the survivors.

The establishment of the funds was introduced in Britain at the revolution; and has since been gradually enlarged, and carried to an amazing extent. The various methods above mentioned have been used in their turns, but perpetual annuities have been granted for the greatest part; and, even when the money was originally advanced on other conditions, the lenders have been sometimes induced, by subsequent offers, to accept of perpetual annuities, instead of the former terms. The debt for which perpetual annuities are granted, is called the *redeemable debt*, and the other is called the *irredeemable debt*. Although the debts thus contracted by government are seldom paid for a long term of years; yet any creditor of the public may obtain money for what is due him when he pleases, by transferring his property in the funds to another; and regular methods are appointed for transacting these transfers in an easy manner. By means of this, the stocks become a kind of circulating capital; and have the same effect, in some respects, as the circulating money in the nation. When a stockholder transfers his share, he may sometimes be able to obtain a greater price than the original value, and at other times be obliged to accept of a less one. The value of the funds depends on the proportion between the interest they bear, and the benefit which may be obtained by applying the money to other purposes. It is influenced by the plenty or scarcity of money, and by the quantity of the public debt; and it is impaired by any event which threatens the safety, or weakens the credit, of the government.

The

The business of stock-jobbing is founded on the variation of the prices of stock. Persons possessed of real property may buy or sell stock, according to their notion that the value is likely to rise or fall, in expectation of making profit by the difference of price. And a practice has taken place among persons who often possess no property in the funds, to contract for the sale of stock against a future day, at a price now agreed on. For instance: A agrees to sell B 1000 l. of bank-stock, to be transferred, in 20 days, for 1200 l. A has, in fact, no such stock; but, if the price of bank stock, on the day appointed for the transfer, should be only 118 *per cent.* A may purchase as much as will enable him to fulfil his bargain for 1180 l. and thus gains 20 l. by the transaction; on the contrary, if the price of bank-stock be 125 *per cent.* he will lose 50 l. The business is generally settled without any actual purchase or transfer of stock, by A paying to B, or receiving from him, the difference between the current price of the stock on the day appointed and the price bargained for.

This practice, which is really nothing else than a wager concerning the price of stock, is contrary to law; yet it is carried on to a great extent. In the language of Exchange-alley, where matters of this kind are transacted, the buyer is called a *bull*, and the seller a *bear*. As neither party can be compelled by law to implement these bargains, their sense of honour, and the disgrace and loss of future credit, which attend a breach of contract, are the principles by which the business is supported. When a person declines to pay his loss, he is called a *lame duck*, and dare never afterwards appear in the Alley. This opprobrious appellation, however, is not bestowed on those whose failure is owing to want of ability, providing they make the same surrender of their property voluntarily, which the law would have exacted if the debt had been intitled to its sanction.

The interest or dividend on the stock is paid half-yearly; and the purchaser has the benefit of the interest due on the stock he buys, from the last term to the time of purchase. Therefore the prices of the stocks rise gradually, *ceteris paribus*, from term to term, and fall at the term when the interest is paid. In comparing the prices of the different stocks, it is necessary to advert to the term when the last interest was paid; and, allowance being made for this circumstance, the prices of all the government stocks, which bear interest at the same rate, must be nearly the same, as they all depend on the same security.

When a loan is proposed, such terms must be offered to the lenders, as may render the transaction beneficial; and this is now regulated by the prices of the old stocks. If the stocks, which bear interest at 4 *per cent.* fell at par, or rather above, the government may expect to borrow money at that rate; but, if these stocks are under par, the government must either grant a higher interest, or some other advantage to the lenders, in compensation for the difference. For this purpose, besides the perpetual annuity, another annuity has sometimes been granted for life, or for a term of years. Lotteries have frequently been employed to facilitate the loan, by intitling the subscribers to a certain number of tickets, for which no higher price is charged than the exact value distributed in prizes, tho'

their market-price is generally 21. or 31. higher. Sometimes an abatement of a certain proportion of the capital has been granted, and a lender intitled to hold 100 l. stock, though in reality he advanced no more perhaps than 95 l.

It belongs to the Chancellor of the Exchequer to propose the terms of the loan in parliament; and he generally makes a previous agreement with some wealthy merchants, who are willing to advance the money on the terms proposed. The subscribers to the loan deposit a certain part of the sum subscribed; and are bound to pay the rest by instalments, or stated proportions, on appointed days, under pain of forfeiting what they have deposited. For this they are intitled, perhaps, not only to hold their share in the capital, but to an annuity for 10 years, and to the right of receiving a certain number of lottery-tickets on advantageous terms. They may sell their capital to one person, their annuity to a second, and their right to the tickets to a third. The value of all these interests together is called *omnium*; and, in order to obtain a ready subscription, it ought to amount to 102 l. or upwards, on 100 l. of capital. This difference is called the *bonus* to the subscribers.

The capital advanced to the public, in the form of transferable stocks, and bearing interest from taxes appropriated for that purpose, is called the *funded debt*. Besides, there is generally a considerable sum due by government, which is not disposed of in that manner, and therefore is distinguished by the appellation of the *unfunded debt*. This may arise from any sort of national expence, for which no provision has been made, or for which the provision has proved insufficient. The chief branches are,

1st, *Exchequer Bills*. These are issued from the exchequer, generally by appointment of parliament, and sometimes without such appointment, when exigencies require. They bear interest from the time when issued, and are taken in by the bank of England, which promotes their circulation.

2^d, *Navy-Bills*. The sums annually granted for the navy have always fallen short of what that service required. To supply that deficiency, the admiralty issues bills in payment of victuals, stores, and the like, which bear interest six months after the time issued. The debt of the navy thus contracted is discharged, from time to time, by parliament.

In time of war, the public expences, since the revolution, have always been much greater than the annual revenue; and large sums have consequently been borrowed. In time of peace, the revenue exceeds the expence, and part of the public debts have frequently been paid off. But, though there have been more years of peace than of war since the funds were established, the debts contracted during each war have much exceeded the payments during the subsequent peace. This will appear by the following abstract of the progress of the national debt.

Debt at peace of Ryfwich, 1697	L. 21,515,472
Debt at the beginning of war 1701	16,394,701
Discharged during peace 1697 to 1701	5,121,071
Debt at peace of Utrecht 1714, including value of annuities afterwards subscribed to South-Sea stock	55,282,978
Contracted in war 1701 to 1714	38,888,277
3 R	Debt

Fundament	Debt at beginning of war 1740, including L. 1,000,000 charged on civil list	L. 47,954,623
tal.	Discharged during peace 1714 to 1739	7,328,355
	Debt at peace of Aix-la-Chapelle, 1748	79,193,313
	Contracted during war 1740 to 1748	31,238,690
	Debt at beginning of war 1756	73,289,673
	Paid off during peace 1748 to 1756	5,903,640
	Debt funded at the peace 1763, including L. 9,839,597 then owing, which was funded in the subsequent years	133,957,270
	Besides this, there was about L. 6,000,000 of debt paid off, without ever being funded.	
	Funded debt, 1775	125,000,000
	Paid off during peace 1763 to 1775, besides unfunded debt above mentioned	8,959,270
	Funded debt at the peace 1783	211,363,254

FUNDAMENT, in anatomy, the lowest part of the intestinum rectum, called by anatomists the *anus*.

See **ANATOMY**, n° 93.

FUNDAMENTAL, in general, something that serves as a base or foundation for another.

FUNDAMENTAL, in music. A *fundamental sound* is that which forms the lowest note of the **CHORD**; and from whence are deduced the harmonical relations of the rest; or, which serves for a key to the tone*. The *fundamental bass* is that which serves for a foundation to the harmony. A *fundamental chord* is that whose bass is fundamental, and in which the sounds are ranged in the same order as when they are generated, according to the experiment so often repeated by M. d'Alembert, in his Preliminary Discourse and Elements of Music†. But as this order removes the parts to an extreme distance one from the other, they must be approximated by combinations or inversions; but if the bass remains the same, the chord does not for this reason cease to bear the name of *fundamental*. Such an example is this chord, *ut mi sol*, included in the interval of a fifth; whereas, in the order of its generation, *ut sol mi*, it includes a tenth, and even a seventeenth; since the fundamental *ut* is not the fifth of *sol*, but the octave of that fifth.

FUNDAMENTAL Bass. This part in music is, according to Rousseau, and indeed according to all authors who have proceeded upon M. Rameau's experiment, in its primary idea, that bass which is formed by the fundamental notes of every perfect chord that constitutes the harmony of the piece; so that under each chord it causes to be heard, or understood, the fundamental sound of that particular chord; that is to say, the sound from whence it is derived by the rules of harmony. From whence we may see, that the fundamental bass can have no other contexture than that of a regular and fundamental succession, without which the procedure of the upper parts would be illegitimate.

To understand this well, it is necessary to be known, that, according to the system of Rameau, which Rousseau has followed in his Dictionary, every chord, tho' composed of several sounds, can only have one, which is its fundamental, *viz.* that which produces this chord, and which is its bass according to the direct and natural order. Now, the bass which prevails under all the

other parts, does not always express the fundamental sound of the chords: for amongst all the sounds which form a chord, the composer is at liberty to transfer to the bass that which he thinks preferable; regard being had to the procedure of that bass, to the beauty of the melody, and above all to the expression, as may afterwards be explained. In this case the real fundamental sound, instead of retaining its natural station, which is in the bass, will either be transferred to some of the other parts, or perhaps even entirely suppressed, and such a chord is called an *inverted* chord.

In reality, says Rameau, a chord inverted does not differ from the chord in its direct and natural order from which it was produced: but as these sounds form different combinations, these combinations have long been taken for fundamental chords; different names have been given them, (which may be seen at the word **ACCORD**, in Rousseau's Dictionary). These names, by the persons who bestowed them, were thought to create and sanctify their distinctions; as if a difference in names could really produce a difference in the species.

M. Rameau in his Treatise of Harmony has shown, and M. d'Alembert in his Elements of Music has still more clearly evinced, that many of these pretendedly different chords were no more than inversions of one single chord. Thus the chord of the sixth is no more than the perfect chord of the third transferred to the bass; by adding a fifth, we shall have the chord of the sixth and fourth. Here there are three combinations of a chord, which only consists of three sounds; those which contain four sounds are susceptible of four combinations, since each of these sounds may be transferred to the bass. But in adding beneath this another bass which, under all the combinations of one and the same chord, always presents the fundamental sound; it is evident, that consonant chords are reduced to the number three, and the number of dissonant chords to four. Add to this all the chords by supposition, which may likewise be reduced to the same fundamentals, and you will find harmony brought to a degree of simplicity in which no person could ever hope to see it whilst its rules remained in that state of confusion where M. Rameau found them. It is certainly, as that author observes, an astonishing occurrence, that the practice of this art could be carried so far as it really was, without knowing its foundation; and that all the rules were so exactly found, without having discovered the principle on which they depended.

After having shown what is the fundamental bass beneath the chords, let us now speak of its procedure, and of the manner in which it connects these chords, among themselves. Upon this point the precepts of the art may be reduced to the six following rules.

1. The fundamental bass ought never to sound any other notes than those of the series or tone in which the composer finds himself, or at least those of the series or tone to which he chooses to make a transition. This of all the rules for the fundamental bass is the first, and most indispensable.

2. By the second, its procedure ought to be so implicitly subjected to the laws of modulation, as never to suffer the idea of a former mode to be lost till that of a subsequent one can be legitimately assumed; that is to say, that the fundamental bass ought never to be de-

vicious,

Fundamen-
tal. vious, or suffer us to be one moment at a loss in what mode we are.

3. By the third, it is subjected to the connection of chords and the preparation of dissonances: a manœuvre which, as we shall afterwards see, is nothing else but a method of producing this connection, and which of consequence is only necessary when the connection cannot subsist without it. See CONNECTION, PREPARATION.

4. By the fourth, it is necessitated, after every dissonance, to pursue that career which the resolution of the dissonance indispensably prescribes. See RESOLUTION.

5. By the fifth, which is nothing else but a consequence of the former, the fundamental bass ought only to move by consonant intervals; except alone in the operation of a broken cadence, or after a chord of the seventh diminished, where it rises diatonically. Every other motion of the fundamental bass is illegitimate.

6. By the sixth, in short, the fundamental bass or harmony ought not to be syncopated; but to distinguish the bars and the times which they contain, by changes of chords properly marked with cadences; in such a manner, for instance, that the dissonances which ought to be prepared may find their preparation in the imperfect time, but chiefly that all the reposés may happen in the perfect time. This sixth rule admits of an infinite number of exceptions; but the composer ought however to be attentive to it, if he would form a music in which the movements are properly marked, and in which the bars may end gracefully.

Wherever these rules are observed, the harmony shall be regular and without fault: this, however, will not hinder the music from being detestable. See COMPOSITION.

A word of illustration on the fifth rule may not be useless. Whatever turn may be given to a fundamental bass, if it is properly formed, one of these alternatives must always be found: either perfect chords moving by consonant intervals, without which these chords would have no connection; or, dissonant chords in operations of cadence: in every other case, the dissonance can neither be properly placed nor properly resolved.

From thence it follows, that the fundamental bass cannot move regularly but in one of these three manners. 1st, To rise or descend by a third or by a sixth. 2dly, By a fourth or a fifth. 3dly, To rise diatonically by means of the dissonance which forms the connection; or by a licence upon a perfect chord. With respect to a diatonic descent, it is a motion absolutely prohibited to the fundamental bass; or, at most, merely tolerated in cases where two perfect chords are in succession, divided by a close expressed or understood. This rule has no other exception: and it is from not discerning the foundation of certain transitions, that M. Rameau has caused the fundamental bass to descend diatonically under chords of the seventh; an operation which is impracticable in legitimate harmony. See CADENCE, DISSONANCE.

The fundamental bass, which they add for no other reason than to serve as a proof of the harmony, must be retrenched in execution, and often in practice it would have a very bad effect; for it is, as M. Rameau

very properly observes, intended for the judgment, and not for the ear. It would at least produce a monotony extremely nauseous by frequent returns of the same chord, which they disguise and vary more agreeably by combining it in different manners upon the continued bass, without reckoning upon the different inversions of harmony, which furnish a thousand means of adding new beauties to the music and new energy to the expression. See CHORD, INVERSION.

But it will be objected, If the fundamental bass is not useful in composing good music, if it must even be retrenched in practice, what good purpose, then, can it serve? We answer, that, in the first place, it serves for a rule to scholars, upon which they may learn to form a regular harmony, and to give to all the parts such a diatonic and elementary procedure as is prescribed them by that fundamental bass. It does more, as we have already said: it proves whether a harmony already formed be just and regular; for all harmony which cannot be subjected to the test of a fundamental bass, must according to all rules be bad. Finally, it serves for the investigation of a continued bass under a given air: though, in reality, he who cannot directly form a continued bass, will scarcely be able to form a fundamental bass, which is better; and much less still will he be able to transform that fundamental bass into a legitimate continued bass. These which follow are, however, the principal rules which M. Rameau prescribes for finding the fundamental bass of a given air.

1. To ascertain with precision the mode in which the composer begins, and those through which he passes. There are also rules for investigating the modes; but so long, so vague, so incomplete, that with respect to this, the ear may be formed long before the rules are acquired; and the dunce who should try to use them, would gain no improvement but the habit of proceeding always note by note, without even knowing where he is.

2. To try in succession under each note the principal chords of the mode, beginning by those which are most analogous, and passing even to the most remote, when the composer sees himself under a necessity of doing so.

3. To consider whether the chord chosen can suit the upper part in what precedes and in what follows, by a just fundamental succession; and when this is impracticable, to return the way he came.

4. Not to change the note of the fundamental bass till after having exhausted all the notes which are allowed in succession in the upper part, and which can enter into its chord; or till some syncopated note in the air may be susceptible of two or a greater number of notes in the bass, to prepare the dissonance which may be afterwards resolved according to rule.

5. To study the intertexture of the phrases; the possible succession of cadences, whether full or avoided; and above all, the pauses which for ordinary return at the end of every four, or of every two bars, so that they may always fall upon perfect and regular cadences.

6. In short, to observe all the rules formerly given for the composition of the fundamental bass.—These are the principal observations to be made for finding one under any given air; for there are sometimes several

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ral different ones which may be investigated. But, whatever may be said to the contrary, if the air has accent and character, there is only one just fundamental bass which can be adapted to it.

After having given a summary explication of the manner in which a fundamental bass should be composed, it should remain to suggest the means of transforming it into a continued bass; and this would be easy, if it were only necessary to regard the diatonic procedure and the agreeable air of this bass. But let us not imagine that the bass, which is the guide and support of the harmony, the soul, and as it were the interpreter, of the air, should be limited to rules so simple: there are others which depend upon principles more certain and more radical; fruitful, but latent principles, which have been felt by every artist of genius, without having been detected by any one. Rousseau hopes, that in his letter upon French music he insinuated this principle. For those who understand him, he imagines he has said enough concerning it, and can never say enough of it for those who do not. See *Rousseau's Miscellanies*, Vol. II. p. 1.

He does not here mention the ingenious system by M. Serre of Geneva, nor his double fundamental bass; because the principles which, with a sagacity meritorious of praise, he had half detected, have afterwards been unfolded by M. Tartini, in a work of which Rousseau has given an account in his article SYSTEM.

FUNDI (anc. geog.), a town of Latium, on the Via Appia, near Cajeta; enjoying all the privileges of Roman citizens, except the right of suffrage and of magistracy. Now *Fondi*; a city of Naples, on the confines of the pope's dominions. E. Long. 14. 20. N. Lat. 41. 35.

FUNDY-BAY, a bay seated between New-England and Acadia or New Scotland, in which there is an excellent fishery.

FUNEN, or FIONIA, a considerable island in Denmark, seated on the Baltic sea, and separated from Jutland by a strait called the *Lesser Belt*, and from the island of Zealand by another called the *Great Belt*. It is fertile in wheat and barley; and abounds in cattle, horses, game of all sorts, and fish. Odensee is the capital town.

FUNERAL RITES, ceremonies accompanying the interment or burial of any person. The word is formed of the Latin *funus*; and that of *funalia*, on account of the torches (which were *funes cera circumdati*) used in the funerals of the Romans; though others derive *funus* from the Greek *φονος*, death or slaughter.

These rites differed among the ancients according to the different genius and religion of each country.

The first people who seem to have paid any particular respect to their dead, were the Egyptians, the posterity of Ham. The first cultivators of idolatrous worship and superstition after the flood; they were also the first who asserted the immortality of the soul, its migration into all kinds of animals in earth, air, and sea, and its return to the human body; which they supposed to be within the term of 3000 years: Hence proceeded their very great care in embalming of their dead bodies, and their being at such vast expences, as they were, in building proper repositories for them; for they were more solicitous about their graves than their houses: This gave birth to those wonders of the

world, the pyramids, which were built for the burial of their kings, with such vast charges, and almost incredible magnificence. See PYRAMID.

Whenever a person died among the Egyptians, his parents and friends put on mournful habits, and abstained from all banquets and entertainments. This mourning lasted from 40 to 70 days, during which time they embalmed the body. See EMBALMING.

When this ceremony was finished, the embalmed body was restored to the friends, who placed it in a kind of open chest, which was preserved either in their houses, or in the sepulchres of their ancestors. But before the dead were allowed to be deposited in the tomb, they underwent a solemn judgment, which extended even to their kings. Of this remarkable custom we have a particular account in the first book of Diodorus Siculus. "Those who prepare to bury a relation, give notice of the day intended for the ceremony to the judges, and to all the friends of the deceased; informing them, that the body will pass over the lake of that district to which the dead belonged: when, on the judges assembled, to the number of more than 40, and ranging themselves in a semicircle on the farther side of the lake, the vessel is set afloat, which those who superintend the funeral have prepared for this purpose. This vessel is managed by a pilot, called in the Egyptian language Charon; and hence they say, that Orpheus, travelling in old times into Egypt, and seeing this ceremony, formed his fable of the infernal regions, partly from what he saw, and partly from invention. The vessel being launched on the lake before the coffin which contains the body is put on board, the law permits all, who are so inclined, to produce an accusation against it. If any one steps forth, and proves that the deceased has led an evil life, the judges pronounce sentence, and the body is precluded from burial; but if the accuser is convicted of injustice in his charge, he falls himself under a considerable penalty. When no accuser appears, or when the accuser is proved to be an unfair one, the relations, who are assembled, change their expressions of sorrow into encomiums on the dead: yet do not, like the Greeks, speak in honour of his family, because they consider all Egyptians as equally well-born; but they set forth the education and manners of his youth, his piety and justice in maturer life, his moderation, and every virtue by which he was distinguished; and they supplicate the infernal deities to receive him as an associate among the blest. The multitude join their acclamations of applause in this celebration of the dead, whom they consider as going to pass an eternity among the just below." Such is the description which Diodorus gives of this funeral judicature, to which even the kings of Egypt were subject. The same author asserts, that many sovereigns had been thus judicially deprived of the honours of burial by the indignation of their people: and that the terrors of such a fate had the most salutary influence on the virtue of their kings.

The funeral rites among the Hebrews were solemn and magnificent. When any person was dead, his relations and friends rent their cloaths; which custom is but faintly imitated by the modern Jews, who only cut off a bit of their garment, in token of affliction. It was usual to bend the dead person's thumb into the hand, and fasten it in that posture with a string; be-

Funeral. cause the thumb then having the figure of the name of God, they thought the devil would not dare to approach it. When they came to the burying-place, they made a speech to the dead in the following terms: "Blessed be God, who has formed thee, fed thee, maintained thee, and taken away thy life. O dead! he knows your numbers, and shall one day restore your life, &c." Then they spoke the elogium, or funeral oration, of the deceased; after which they said a prayer, called the *righteousness of judgment*; then turning the face of the deceased towards heaven, they called out, "Go in peace."

Among the ancient Greeks it was usual sometimes before the interment, to put a piece of money into the mouth of the deceased, which was thought to be Charon's fare for wafting the departed soul over the infernal river. This ceremony was not used in those countries which were supposed to be situated in the neighbourhood of the infernal regions, and to lead thither by a ready and direct road. The corpse was likewise furnished with a cake, composed of flour, honey, &c. which was designed to appease the fury of Cerberus the door-keeper of hell, and to procure the ghost a safe and quiet entrance. During the time the corpse continued in the house, there stood before the door a vessel of water: the design of which was, that those concerned about the body might purify themselves by washing; it being the opinion of the Greeks, as well as of the Jews, that pollution was contracted by touching a dead body.

The ceremonies by which they expressed their sorrow for the death of their friends were various; but it seems to have been a constant rule to recede as much as possible in habit and behaviour from their ordinary customs. For this reason they abstained from banquets and entertainments; they divested themselves of all ornaments; they tore, cut off, or shaved their hair, which they cast into the funeral pile, to be consumed with the body of their deceased friend. Sometimes they threw themselves on the ground, and rolled in the dust, or covered their head with ashes; they beat their breasts, and even tore their flesh with their nails, upon the loss of a person they much lamented. When persons of rank, such as public magistrates or great generals, died, the whole city put on a face of mourning; all public meetings were intermitted; the schools, baths, shops, temples, and all places of concourse, were shut up.

After interment followed the *epule* or feasts, at which the company used to appear crowned; when they spoke in praise of the dead, so far as they could go with truth, it being esteemed a notorious wickedness to lie upon such an occasion. And not only at those feasts, but even before the company departed from the sepulchre, they were sometimes entertained with a panegyric upon the dead person.

The Grecian soldiers, who died in war, had not only their tombs adorned with inscriptions showing their names, parentage, and exploits, but were also honoured with an oration in their praise. Particularly the custom among the Athenians in the interment of their soldiers was as follows, namely, "They used to place the bodies of their dead in tents three days before the funeral, that all persons might have opportunity to find out their relations, and pay their last respects

to them. Upon the fourth day, a coffin of cypress was sent from every tribe, to convey the bones of their own relations; after which went a covered hearse, in memory of those whose bodies could not be found. All these, accompanied with the whole body of the people, were carried to the public burying place, called *Ceramicus*, and there interred. One oration was spoken in commendation of them all, and their monuments adorned with pillars, inscriptions, and all other ornaments usual about the tombs of the most honourable persons. The oration was pronounced by the fathers of the deceased persons, who had behaved themselves most valiantly. Thus, after the famous battle at Marathon, the fathers of Callimachus and Cynægryrus were appointed to make the funeral oration. And upon the return of the day, upon which the solemnity was first held, the same oration was constantly repeated every year."

Interring or laying the dead in the ground, seems to have been the most ancient practice among the Greeks; though burning came afterwards to be generally used among them. It was customary to throw into the funeral pile those garments the deceased usually wore. The pile was lighted by one of the deceased's nearest relations or friends, who made prayers and vows to the winds to assist the flames, that the body might quickly be reduced to ashes; and during the time the pile was burning, the dead person's friends stood by it, pouring libations of wine, and calling upon the deceased.

The funeral rites among the ancient Romans were very numerous. The deceased was kept seven days; and every day washed with hot water, and sometimes with oil, that, in case he were only in a slumber, he might be thus waked; and every now and then his friends meeting, made a horrible outcry or shout, with the same view; which last action they called *conclamatio*. The third conclamation was on the seventh day; when, if no signs of life appeared, the defunct was dressed and embalmed by the *pollinctores*; placed in a bed near the door, with his face and heels towards the street; and the outside of the gate, if the deceased were of condition, was garnished with cypress boughs. In the course of these seven days, an altar was raised near his bed side, called *acerra*; on which his friends every day offered incense; and the *libitinarii* provided things for the funeral.

On the seventh day a crier was sent about the city, to invite the people to the solemnization of the funeral in these words: *Exequias L. Tit. L. filii, quibus est commodum ire, jam tempus est. Ollus (i. e. ille) ex edibus effertur.* The people being assembled, the last conclamation ended, and the bed was covered with purple: a trumpeter marched forth, followed by old women called *præfica*, singing songs in praise of the deceased; lastly, the bed followed, borne by the next relations; and if the person were of quality and office, the waxen images of all his predecessors were carried before him on poles. The bed was followed by his children, kindred, &c. *atrati*, or in mourning: from which act of following the corpse, these funeral rites were called *exequia*. The body thus brought to the rostra, the next of kin, *laudabat defunctum pro rostris*, made a funeral oration in his praise and that of his ancestors. This done, the body was carried to the *pyra*, or funeral pile; and there burnt: his friends first cutting off a finger, to be bu-

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Funeral. ried with a second solemnity. The body consumed, the ashes were gathered; and the priest sprinkling the company thrice with clean water, the eldest of the *præfice* crying aloud, *ilicet*, dismissed the people, who took their leave of the deceased in this form, *Vale, vale, vale: nos te ordine quo natura permiserit, sequemur.*—The ashes, inclosed in an urn, were laid in the sepulchre or tomb.

The ancient Christians testified their abhorrence of the Pagan custom of burning the dead; and always deposited the body entire in the ground: and it was usual to bestow the honour of embalming upon the martyrs at least, if not upon others. They prepared the body for burial, by washing it with water, and dressing it in a funeral attire. The exportation or carrying forth of the body was performed by near relations, or persons of such dignity as the circumstances of the deceased required. Psalmody, or singing of psalms, was the great ceremony used in all funeral processions among the ancient Christians.

In the *Romish church*, when a person is dead, they wash the body, and put a crucifix in its hand. At its feet stands a vessel full of holy water, and a sprinkler, that they who come in may sprinkle both themselves and the deceased. In the mean time some priest stands by the corpse, and prays for the deceased till it is laid in the earth. In the funeral procession, the exorcist walks first, carrying the holy water; next the cross-bearer, afterwards the rest of the clergy, and last of all the officiating priest. They all sing the *miserere*, and some other psalms; and at the end of each psalm a *requiem*. We learn from Alet's ritual, that the faces of deceased laymen must be turned towards the altar, when they are placed in the church; and those of the clergy, towards the people. The corpse is placed in the church surrounded with lighted tapers: after the office for the dead, mass is said; then the officiating priest sprinkles the corpse thrice with holy water, and as often throws incense on it. The body being laid in the grave, the friends and relations of the deceased sprinkle the grave with holy water.

The funeral ceremonies of the *Greek church* are much the same with those of the Latin. It needs only be observed, that, after the funeral service, they kiss the crucifix, and salute the mouth and forehead of the deceased: after which each of the company eats a bit of bread and drinks a glass of wine in the church, wishing the soul a good repose, and the afflicted family all consolation.

FUNERAL-GAMES, a part of the ceremony of the ancient funerals.

It was customary for persons of quality, among the ancient Greeks and Romans, to institute games, with all sorts of exercises, to render the death of their friends more remarkable. This practice was generally received, and is frequently mentioned by ancient writers. Patroclus's funeral games take up the greatest part of one of Homer's *Iliads*; and Agamemnon's ghost is introduced by the same poet, telling the ghost of Achilles, that he had been a spectator at a great number of such solemnities.

The celebration of these games among the Greeks mostly consisted of horse-races; the prizes were of different sorts and value, according to the quality and magnificence of the person that celebrated them. The

garlands given to victors on this occasion were usually of parsley, which was thought to have some particular relation to the dead.

Those games, among the Romans, consisted chiefly of processions; and sometimes of mortal combats of gladiators around the funeral pile. They, as well as the Greeks, had also a custom, though very ancient, of cutting the throats of a number of captives before the pile, as victims to appease the manes of the deceased. Cæsar relates, that the Gauls had this custom.

The funeral games were abolished by the emperor Claudius.

FUNERAL Oration, a discourse pronounced in praise of a person deceased, at the ceremony of his funeral.

This custom is very ancient. In the latter part of the account above given of the Egyptian ceremonies of interment, may be perceived the first rudiments of funeral orations, and what was the subject of them, which were afterwards moulded into a more polite and regular form by other nations, who adopted this custom. Nor can we omit remarking, that those funeral solemnities were attended not only with orations in praise of the deceased, but with prayers for him; which prayers, it seems, were made by one who personated the deceased: an entire form of one of them is preserved by Porphyry, and perhaps it may in some measure gratify the reader's curiosity to recite it from him. "When (says he) they (the Egyptians) embalm their deceased nobles, they privately take out the entrails, and lay them up in an ark or chest: moreover, among other things which they do in favour of the deceased, lifting up the ark or chest to the sun, they invoke him; one of the *Libitinarii* making a prayer for the deceased, which Euphantus has translated out of the Egyptian language, and is as follows:—O lord, the sun, and all the gods who give life to men, receive me, and admit me into the society of the immortal ones; for as long as I lived in this world, I religiously worshipped the gods whom my parents showed me, and have always honoured those who begat my body: nor have I killed any man, nor have I defrauded any of what has been committed to my trust, nor have I done any thing which is inexpiable. Indeed, whilst I was alive, if I have sinned either by eating or drinking any thing which was not lawful; not through myself have I sinned, but through these, showing the ark and chest where the entrails were. And having thus spoke, he casts it into the river, but the rest of the body he embalms as pure."

The Grecians received the seeds of superstition and idolatrous worship from the Egyptians, through the coming of Cecrops, Cadmus, Danaus, and Erechtheus, into Greece; and among other customs transplanted from Egypt, were the solemnities used at the burial of the dead. Of these, an encomium on the deceased always formed a part, as particularly noticed under the preceding article.

From the Egyptians and Grecians, especially from the latter, the Romans received many of their laws and customs, as well as much of their polytheism and idolatrous worship. It is well known, that the custom of making funeral orations in praise of the dead obtained among them; and the manner in which their funeral services were performed has been already described.

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Funeral. scribed. The corpse being brought into their great oratory, called the *Rostra*, the next of the kin *laudabat defunctum pro rostris*, that is, made a funeral oration, in the commendation principally of the party deceased, but touching the worthy acts also of those his predecessors whose images were there present. The account given by Dr Kennet is in these words: "In all the funerals of note, especially in the public or indictive, the corpse was first brought with a vast train of followers into the Forum; here one of the nearest relations ascended the rostra, and obliged the audience with an oration in praise of the deceased. If none of the kindred undertook the office, it was discharged by some of the most eminent persons in the city for learning and eloquence, as Appian reports of the funeral of Sylla. And Pliny the younger reckons it as the last addition to the happiness of a very great man, that he had the honour to be praised at his funeral by the most eloquent Tacitus, then consul; which is agreeable to Quintilian's account of this matter, *Nam et funebres*, &c. For the funeral orations (says he) depend very often on some public office, and by order of senate are many times given in charge to the magistrates to be performed by themselves in person. The invention of this custom is generally attributed to Valerius Poplicola, soon after the expulsion of the regal family. Plutarch tells us, that honouring his colleague's obsequies with a funeral oration, it so pleased the Romans, that it became customary for the best men to celebrate the funerals of great persons with speeches in their commendations." Thus Julius Cæsar, according to custom, made an oration in the rostra, in praise of his wife Cornelia, and his aunt Julia, when dead; wherein he showed, that his aunt's descent, by her mother's side, was from kings, and by her father's from the gods. Plutarch says, that "he approved of the law of the Romans, which ordered suitable praises to be given to women as well as to men, after death." Though by what he says in another place, it seems that the old Roman law was, that funeral orations should be made only for the elder women; and therefore he says, that Cæsar was the first that made one upon his own wife, it not being then usual to take notice of younger women in that way: but by that action he gained much favour from the populace, who afterwards looked upon him, and loved him as a very mild and good man. The reason why such a law was made in favour of the women, Livy tells us, was this, That when there was such a scarcity of money in the public treasury, that the sum agreed upon to give the Gauls to break up the siege of the city and capital could not be raised, the women collected among themselves and made it up; who hereupon had not only thanks given them, but this additional honour, that after death, they should be solemnly praised as well as the men: which looks as if, before this time, only the men had those funeral orations made for them.

This custom of the Romans very early obtained among the Christians. Some of their funeral sermons or orations are now extant, as that of Eusebius on Constantine; and those of Nazianzen on Basil and Cæsarius; and of Ambrose on Valentinian, Theodosius, and others. Gregory, the brother of Basil, made

ἡμετέριον λόγον, a funeral oration, for Melitius bishop of

Antioch: in which orations, they not only praised the dead, but addressed themselves to them, which seems to have introduced the custom of praying to departed saints. Now these orations were usually made before the bodies of the deceased were committed to the ground; which custom has been more or less continued ever since, to this day.

Thus it appears, that those rites and ceremonies among the heathens, which have been delivered from one people to another, are what have given birth to

FUNERAL Sermons and Orations among Christians. Though this practice is considerably improved, and cleared of many things which would smell too rank of paganism, and is thrown into a method which, perhaps, may be of some service to Christianity; yet, notwithstanding this new dress, its original may very easily be discerned. The method in which the characters of deceased persons are given in our funeral sermons, is very much the same with that observed in those pagan orations; where first an account is given of the parentage of the deceased, then of his education; after that, we hear of his conduct in riper years: then his many virtues are reckoned up, with his generous, noble, and excellent performances.—Nor let the practice be condemned because of its rise and original; for why may not the custom of heathens, if just and laudable in themselves, and no ways pernicious to Christianity in their consequences, be followed by Christians? Only, since we are come into this practice, there is one thing we should take care to follow them in; and that is, not to make those sermons or orations for every one; but for those only whose characters are distinguished, who have been eminently useful in the world, and in the church of Christ. The old heathens honoured those alone with this part of the funeral solemnity, who were men of probity and justice, renowned for their wisdom and knowledge, or famous for warlike exploits: This, as Cicero* informs us, being part of the law for burials, * *De Legibus* 1. 2. which directs, that the praises only of honourable persons shall be mentioned in the oration. It would be much more agreeable, therefore, if our funeral discourses were not so common, and if the characters given of the deceased were more just; devoid of that fulsome flattery with which they too often abound.

FUNGI (from *σπογγος*, *fungus*), the name of the 4th order of the 24th class of vegetables, in the Linnæan system; comprehending all those which are of the mushroom kind, and which in Tournefort constitute the 2d, 3d, 4th, 5th, 6th, 7th, and 8th, genera of the first section in the class xvii. This order in Linnæus contains 10 genera. See **AGARICUS**, **BOLETUS**, **CLAVARIA**, **LYCOPERDON**, &c.

FUNGI, an order of plants in the *Fragmenta Methodi Naturalis* of Linnæus. See **BOTANY**, p. 470.

The ancients called fungi *children of the earth*, meaning, no doubt, to indicate the obscurity of their origin. The moderns have likewise been at a loss in what rank to place them; some referring them to the animal, some to the vegetable, and others to the mineral kingdom.

Messrs Wilck and Miinchausen have not scrupled to rank these bodies in the number of animal productions; because, when fragments of them or their seeds were macerated in water, these gentlemen perceived a quantity of animalcules discharged, which they supposed capable

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Fungi.

Fungi.

capable of being changed into the same substance. It was the ancient opinion, that beef could produce bees; but it was reserved for Messrs Wilck and Miinchausen to suppose, that bees could produce beef. Wilck asserts, that fungi consist of innumerable cavities, each inhabited by a polype; and he does not hesitate to ascribe the formation of them to their inhabitants, in the same way as it has been said that the coral, the lichen, and the mucor, were formed. Hedwig has lately shown how ill founded this opinion is with respect to the lichen; and M. Durande has demonstrated its falsity with regard to the corallines. "Indeed (says M. Bonnet, talking of the animality of fungi) nothing but the rage for paradox could induce any one to publish such a fable; and I regret that posterity will be able to reproach our times with it. Observation and experiment should enable us to overcome the prejudices of modern philosophy; now, that those of the ancient have disappeared and are forgotten."

It cannot be denied that the mushroom is one of the most perishable of all plants, and it is therefore the most favourable for the generation of insects. Considering the quickness of its growth, it must be furnished with the power of copious absorption; the extremity of its vessels must be more dilated than in other plants. Its root seems, in many cases, to be merely intended for its support; for some species grow upon stones or moveable sand, from which it is impossible that they can draw much nourishment. We must therefore suppose, that it is chiefly by the stalk that they absorb. These stalks grow in a moist and tainted air, in which float multitudes of eggs, so small, that the very insects they produce are with difficulty seen by the microscope. These eggs may be compared to the particles of the Byssus, 100,000 of which, as M. Gleditsch says, are not equal to the fourth of a grain. May we not suppose, that a quantity of such eggs are absorbed by the vessels of the fungus, that they remain there, without any change, till the plant begins to decay? Besides, the eggs may be only deposited on the surface of the plant, or they may exist in the water into which they are thrown for examination. Do not we see that such eggs, dispersed through the air, are hatched in vinegar, in paste, &c. and wherever they find a convenient nidus for their development? Can it be surprising then, that the corruption of the mushroom should make the water capable of disengaging certain beings that are really foreign to both?

It is not more easy to acquiesce in the opinions of those naturalists who place the fungi in the mineral kingdom, because they are found growing on porous stones, thence called *Lapides Fungarii*; which, however, must be covered with a little earth, and be watered with tepid water, in order to favour the growth. Such mushrooms are no more the produce of the stone, than the lichen is of the rock to which it adheres, or the moss of the tree on which it is found. We have only to observe the growth of mushrooms, to be convinced, that this happens by development, and not by addition or combination of parts as in minerals. The opinion of Boccone, who attributed them to an unctuous matter performing the function of seed, and acquiring extension by apposition of similar parts; and that of Morison, who conceived that they grew spontaneously out of the earth by a certain mixture of salt and sul-

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phur, joined with oils from the dung of quadrupeds; have now no longer any adherents. Fungi are produced, they live, they grow, by development; they are exposed to those vicissitudes natural to the different periods of life which characterize living substances; they perish and die. They extract, by the extremity of their vessels, the juices with which they are nourished; they elaborate and assimilate them to their own substance. They are, therefore, organized and living beings, and consequently belong to the vegetable kingdom. But whether they are real plants, or only the production of plants, is still a matter in dispute with the ablest naturalists.

Some ancient authors have pretended to discover the seed of mushrooms; but the opinion was never generally received. Petronius, when he is laughing at the ridiculous magnificence of his hero Trimalcio, relates, that he had written to the Indies for the seed of the morelle.

These productions were generally attributed to the superfluous humidity of rotten wood, or other putrid substances. The opinion took its rise from observing that they grew most copiously in rainy weather. Such was the opinion of Tragus, of Bauhin, and even of Columna, who, talking of the peziza, says, that its substance was more solid and harder, because it did not originate from rotten wood, but from the *pituita* of the earth. It is not surprising that, in times when the want of experiment and observation made people believe that insects could be generated by putrefaction, we should find the opinion general, that fungi owed their origin to the putrescence of bodies, or to a viscid humour analogous to putridity.

Malpighi could not satisfy himself as to the existence of seeds which other botanists had pretended to discover. He only says, that these plants must have them, or that they perpetuate themselves and shoot by fragments. Micheli, among the moderns, appears to have employed himself most successfully on this subject. He imagined, that he not only saw the seeds, but even the stamens, as well as the little transparent bodies destined to favour the dissemination and the fecundation of these seeds. Before this author, Lister thought he perceived seeds in the *Fungus perosus crassus magnus* of John Bauhin: the little round bodies that are found in the pezizæ and helvellæ, at that time, passed for seeds; which did not appear at all probable to Marfigli, considering that the eye, when assisted with the very best microscopes, could perceive nothing similar in much larger fungi. Indeed these bodies may be the capsules or covers of the seeds, if they are not the seeds themselves. However this may be, Marfigli, observing that fungi were often without roots or branches, and that they wanted flowers and seeds, the means which nature employs for the production of perfect plants, thought himself warranted in doubting whether these beings could be ranked in the number of vegetables.

The doubts of Marfigli prompted him to observe the formation of fungi. Their matrix he called *Situs*: he imagined they grew in places where they met with an unctuous matter, composed of an oil mixed with nitrous salt, which, by fermentation, produced heat and moisture, and insinuated itself between the fibres of wood; that is, he imagined them the production of a viscid and putrescent humour. Lancelli, in like manner, considered

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sidered fungi as owing their existence to the putrefaction of vegetables, and supposed them a disease in the plant; but he imagined, "that the fibres of the tree were necessary to their production," as is the case in the formation of galls; he compared them to the warts and other excrescences of the human body. He added, that such fungous vegetable tumors must necessarily assume various forms and figures, from the fluids which distend the tubes and vessels relaxed by putrescence, from the ductility of the fibres and their direction, and from the action of the air.

This opinion has been refuted by the celebrated naturalist M. de Jussieu, in the Memoirs of the Academy of Sciences for the year 1728. He maintains, that the fungi have a great analogy with the lichen, which is allowed to be a vegetable; that, like the lichen, they are divested of stalk, branches, and leaves: that, like it, they grow and are nourished upon the trunks of trees, on pieces of rotten wood, and on all sorts of putrid vegetables; that they resemble the lichen too in the rapidity of their growth, and the facility with which many of them may be dried and restored to their former figure, upon being immersed in water; and, lastly, that there is a great similarity in the manner in which their seeds are produced. He affirms, that only the warts and excrescences which grow on animal bodies, and the knots and other tumors that are to be found on trees, can be compared with one another; for they are composed equally of the solid and liquid substance of the plant or animal on which they grow; whereas, the matter of the fungi is not only quite distinct from that of the plants on which they are found, but often entirely similar to the substance of those that spring immediately from the earth.

The organization, says M. de Jussieu, which distinguishes plants and other productions of nature, is visible in the fungi; and the particular organization of each species is constant at all times and in all places; a circumstance which could not happen if there were not an animal reproduction of species, and consequently a multiplication and propagation by seed. This is not, he says, an imaginary supposition; for the seeds may be felt like meal upon mushrooms with gills, especially when they begin to decay; they may be seen with a magnifying glass, in those that have gills with black margins: and, lastly, says he, botanists can have no doubt that fungi are a distinct class of plants, because, by comparing the observations made in different countries with the figures and descriptions of such as have been engraven, the same genera and the same species are every where found.

Notwithstanding this refutation by M. de Jussieu, another naturalist, M. de Necker, has lately maintained, in his work intitled *Mycitologia*, That the fungi ought to be excluded from the three kingdoms of nature, and be considered as intermediate beings. He has observed, like Marsigli, the matrix of the fungi: and has substituted the word *carche* (initium faciens) instead of *stus*; imagining that the rudiment of the fungus cannot exist beyond that point in which the development of the filaments or fibrous roots is perceived. He allows, that fungi are nourished and grow like vegetables; but he thinks that they differ very much from them in respect of their origin, structure, nutrition, and rapidity of growth. He says, that the various ves-

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sels which compose the organization of vegetables are not to be found in the fungi, and that they seem entirely composed of cellular substance and bark; so that this simple organization is nothing more than an aggregation of vessels endowed with a common nature, that suck up the moisture in the manner of a sponge; with this difference, that the moisture is assimilated into a part of the fungus. Lastly, That the fructification, the only essential part of a vegetable, and which distinguishes it from all other organized bodies, being wanting, fungi cannot be considered as plants. This he thinks confirmed by the constant observation of those people who gather the morelle and the mushroom, and who never find them in the same spots where they had formerly grown. As the generation of fungi, says M. Necker, is always performed when the parenchymatous or cellular substance has changed its nature, form, and function, we must conclude that it is the degeneration of that part which produces these bodies.

But if fungi were owing merely to the degeneration of plants, they would be still better intitled to constitute a new kingdom. They would then be a decomposition, not a new formation or new bodies. Besides, we cannot deny, that in those bodies which form the limit between the animal and vegetable kingdoms, the organization becomes simple, as the organs destined for nutrition are multiplied; but, as the last in the class of insects belongs to the animal kingdom, fungi ought, notwithstanding the simplicity of their organization, still to belong to the vegetable kingdom. The parenchymatous or cellular substance, which, as Mr Bonnet says, is universally extended, embraces the whole fibrous system, and becomes the principal instrument of growth, must naturally be more abundant in these productions; and this accounts for the rapidity of their enlargement. Besides, growth, whether slow or rapid, never was employed to determine the presence or absence of the vegetable or animal character. The *draba verna*, which in a few weeks shoots, puts forth its leaves, its flowers, and fruit, is not less a plant than the palm. The insect that exists but for a day, is as much an animal as the elephant that lives for centuries. As to the seeds of the fungi, it is probable that nature meant to withdraw from our eyes the dissemination of these plants, by making the seeds almost imperceptible; and it is likewise probable, that naturalists have seen nothing but their capsules. Since, however, from the imperfection of our senses, we are unable to perceive these seeds, ought we to infer that they do not exist? Are we authorized to conclude this, because we do not find mushrooms where we have found them a year before? Undoubtedly not; for the greater part of plants require a particular soil, and the same mould that this year will foster a rare plant, will next year allow it to perish. Neither are we at liberty to deny the existence of these seeds, because those bodies which have been called their seeds, and the fragments or cuttings of the plants themselves, have not produced others of the same species. Nature seems to have reserved for herself the care of disseminating certain plants: It is in vain, for instance, that the botanist sows the dust found in the capsules of the orchis, which every one allows to be the seed. But, after all, what are those parts in the fungi casually observed by

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naturalists, and which they have taken for the parts of fructification? These are quite distinct from the other parts; and whatever may be their use, they cannot have been formed by a prolongation of the cellular substance, or of the fibres of the tree on which the fungus grows: they are, therefore, owing, like flower and fruit, to the proper organization of the plant. These plants, therefore, have a particular existence, independent of their putrefying nidus. The gills of certain fungi, which differ essentially from the rest of the plant in their conformation, would be sufficient to authorize this latter opinion. But can putrefaction create an organic substance?

Nature undoubtedly disseminates through the air, and over the surface of the earth, innumerable seeds of fungi, as well as eggs of insects. The plant and the animal are excluded, when the nidus or the temperature is favourable for their development. No fortuitous concurrence, either of atoms or fluids, could produce bodies so exquisitely and so regularly organized. It is sufficient to throw one's eyes on the beautiful plates which Schæffer has published of them, and compare them, by the glass, with the warts and other excrescences of animals, to be convinced that they have not the same origin. The function of the cellular substance in vegetables must be greatly superior to that in animals, if it could produce any thing but deformities.

The greater part of fungi exhibit a configuration much too regular, constant, and uniform, to be the effect of chance or putrefaction. As this form is preserved the same in all places where fungi have been found, it follows, that they contain in themselves the principles of their reproduction. They resemble the mistletoe, and other parasitic plants, which are perfectly distinct from the trees on which they grow. The fungi, therefore, are organized and living substances, or true plants. If the manner of their production is unknown, that of some insects is so too.

FUNGIBLES, in Scots law, are such things as are estimated by number, weight, or measure; as, coin, butter, ale, &c.

FUNGITÆ, in natural history, a kind of fossil coral, of a conic figure, though sometimes flattened and striated longitudinally.

FUNGUS, in surgery, denotes any spongy excrescence. See SURGERY.

FUNNEL of a CHIMNEY, the shaft or smallest part of the waste, where it is gathered into its least dimensions.

Palladio directs, that the funnels of chimneys be carried through the roof four or five feet at least, that they may carry the smoke clear from the house into the air. See the article CHIMNEY.

He also advises, that chamber chimneys be not made narrower than 10 or 11 inches, nor broader than 15: for if too narrow, the smoke will not be able to make its way; and, if too wide, the wind will drive it back into the room.

FUR, or FURR, in commerce. See FURR.

FURBISHER, a person who furbishes, polishes, or cleans arms, as guns, swords, pistols, &c.; which is chiefly performed with emery. See the article EMERY.

FURCA, in antiquity, a piece of timber resembling a fork, used by the Romans as an instrument of punishment.

The punishment of the furca was of three kinds: the first only ignominious, when a master, for small offences, forced a servant to carry a furca on his shoulders about the city. The second was penal, when the party was led about the circus, or other place, with the furca about his neck, and whipped all the way. The third was capital, when the malefactor having his head fastened on the furca, was whipped to death.

FURCHE, in heraldry, a cross forked at the ends.

FURETIERE (Antony), an ingenious and learned Frenchman, was born at Paris in 1620; and after a liberal education became eminent in the civil and canon law. He was first an advocate in the parliament; and afterwards taking orders, was presented with the abbey of Chalivoy, and the priory of Chuines. Many works of literature recommended him to the public: but what he is chiefly known by and valued for, is his Universal Dictionary of the French Tongue, in which he explains the terms of art in all sciences. He had not, however, the pleasure of seeing this useful work published before his death; which happened in 1688. He was of the French academy; and the disputes and quarrels which he had with certain members of it made a great noise in the world.

FURIA, in zoology, a genus of insects belonging to the order of vermes zoophyta. There is but one species, viz. the infernalis. This has a linear smooth body ciliated on each side, with reflexed feelers pressed to its body. In Finland, Bothnia, and the northern provinces of Sweden, it was not unfrequently that people were seized with a pungent pain, confined to a point, in the hand or other exposed part of the body, which presently increased to a most excruciating degree, and hath sometimes been suddenly fatal. This disorder was more particularly observed in Finland, especially about boggy and marshy places, and always in autumn. At length it was discovered that this pain instantly succeeded somewhat that dropped out of the air, and in a moment penetrated and buried itself in the flesh. The Finlanders had tried variety of applications to no purpose, until at length a poultice of curds or cheese was found the most effectual in easing the pain: and the event confirmed that the insect was allured by this application to leave the flesh; as, on its removal, this worm, no longer than the sixth of an inch, was found in it, and thus the cause of this painful disease explained. But by what means this creature is raised into the air, is as yet unknown.

FURIES, in Pagan antiquity, certain goddesses, whose office it was to punish the guilty after death. They were three in number: Alecto, Megæra, and Tisiphone; who were described with snakes instead of hair, and eyes like lightning, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to discover, and the former to punish, the guilty: and they were supposed to be constantly hovering over such persons as had been guilty of any enormous crime.

Mythologists suppose, that Tisiphone punished the crimes which sprang from hatred or anger; Megæra, those from envy; and Alecto, those from an insatiable pursuit after riches and pleasure. They were worshipped at Cafina in Arcadia, and at Carmia in Peloponnesus. They had a temple at Athens near the Areopagus.

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gus, and their priests were chosen from amongst the judges of that court. At Telphusia, a city in Arcadia, a black ewe was sacrificed to them.

FURIUS (Bibaculus), a Latin poet who flourished about 103 B. C. He wrote annals in verse, of which Macrobius recites some fragments. Suetonius also relates some verses of his on Valerius Cato, in his *Illustrious Grammarians*.

FURLING, in the sea language, signifies the wrapping up and binding any sail close to the yard; which is done by hawling upon the clew-lines, bunt-lines, &c. which wraps the sail close together, and being bound fast to the yard the sail is furlled.

FURLONG, a long measure, equal to one eighth of a mile, or 40 poles.

It is also used in some law-books for the eighth part of an acre.

FURLOUGH, in the military language, a licence granted by an officer to a soldier, to be absent for some time from his duty.

FURNACE, an utensil or vessel proper to contain fire, or to raise and maintain a vehement fire in, whether of coal or wood.—Of these there are a great variety, according to the different uses to which they are applied.

In all furnaces the principal things to be attended to are, 1. To confine the heat as much as possible to the matter to be operated upon; 2. To prevent its being dissipated; 3. To produce as much heat with as little fuel as possible; and, 4. To have it in our power to regulate the degree of heat according to our pleasure.

To answer the first intention, the fire is usually confined in a chamber or cavity built on purpose for it, and furnished with a door for putting in the fuel; a grate for supporting it, and allowing air to pass thro', as well as the ashes to drop down into a cavity provided on purpose, and called the *ash-pit*. Thus the heat produced by the inflamed fuel is confined by the sides of the furnace, and obliged to spend great part of its force upon the subject inclosed.

The second intention, *viz.* to prevent the dissipation of the heat, is obtained by shutting the door of the furnace; taking care that the chimney be not too wide, and that the matter to be acted upon be placed in such a manner that the fire may have its full effect upon it as it goes up the chimney.

The third intention, which is the most important, is at the same time the most difficult to answer, and depends entirely upon the proportion between the spaces betwixt the furnace bars and the wideness and height of the chimney. This will appear from a consideration of the principles on which the degrees of inflammation are produced. These depend entirely on the current of air which passes through the inflamed fuel. As soon as the fuel is set on fire, a certain degree of heat is produced; but unless a constant influx of air is admitted through the burning fuel, the fire is instantly extinguished; nor is it possible by any means to renew the inflammation until we admit a stream of fresh air among the fuel. When this is done, a rarefaction commences in the air of the fire-place of the furnace; so that it is no longer a counterpoise to the external air, and is therefore driven up the chimney

by that which enters at the ash-pit. This again passing through the fuel, is rarefied in its turn; and giving place to fresh quantities, there is a constant flow of air up the chimney. In proportion to the rarefaction of the air in the fire-place, the greater is the heat. But by a certain construction of the furnace, the under part of the chimney will become almost as strongly heated as the fire-place; by which means, though a very strong current of air is forced through the fuel, yet as great part of the heat is spent on the chimney, where it can be of no use, the fuel is wasted in a very considerable degree. To avoid this, we have no other method than to contract the throat of the chimney occasionally by a sliding plate; which when put quite in, shuts up the whole vent; and by being drawn out more or less, leaves a larger or smaller vent at pleasure. This plate ought to be quite drawn out till the fuel is thoroughly kindled, and the furnace well heated, so that a current of air may flow strongly through the fuel. After this the plate is to be put in a certain length, so as just to prevent the smoke from coming out at the door of the furnace. The rarefaction of the air in the fire-place will solicit a very considerable draught of air, which will keep the fuel inflamed to a great degree; at the same time that the heat, being reflected from every part of the furnace excepting that narrow passage where the smoke goes up, becomes very intense. A large quantity of fuel may be put in at once, which will consume slowly, and thus require but little attention in comparison with those furnaces where no such precaution is used. The sliding-plate may be made of cast-iron in those furnaces where no great heat is excited; but in others fire-clay will be more convenient. The contrivance, however, is scarce applicable to those furnaces where great quantities of metal are to be melted; and accordingly the waste of fuel there is immense. It is computed, that the iron works of Carron in Stirlingshire consume annually as many coals as would be sufficient for a city containing 700,000 inhabitants.

The fourth intention, *viz.* that of regulating the heat, is accomplished by allowing only a certain quantity of air to pass through the fuel. For this purpose, according to Dr Black, it is necessary to have the command of the furnace below; the parts above being frequently filled with small quantities of soot. The best method of managing this is to shut up the door of the ash-hole perfectly close, and to have a set of round holes bearing a certain proportion to one another; and their areas being as 1, 2, 4, 8, 16, &c. Seven or eight of these ought to be made in the door of the ash-pit, which will give a sufficient command over the fire. When the fire is to be increased to the utmost, all the passages both above and below are to be thrown open, and the height of the vent augmented; which, by increasing the height of the column of rarefied air, increases also the motion of that through the fuel, and of consequence also the heat of the furnace. Macquer recommends another tube applied to the ash-pit, widest at the end farthest from the furnace, and tapering gradually towards it. The intention of this is to augment the current and velocity of the air by its being made to pass from a wider into a narrower vent; but though this is no doubt true, the air will not ultimately move with greater velocity than

Furnace.

if the tube were not there. It can only be useful therefore in cases where the furnace is placed in a small room, and the tube itself has a communication with the external air.

Pl. CCIV.
Fig. 1.Cramer's
Art of Es-
say.

An *Essay* or *Cupelling FURNACE* is made in the following manner. 1. Make with iron plates a hollow quadrangular prism, eleven inches broad and nine inches high (*aa, bb*), ending at top in a hollow quadrangular pyramid (*bb, cc*) seven inches high, terminating in an aperture at top seven inches square. This prism must be closed at bottom with another iron plate, which serves as a basis or bottom to it (*aa*). 2. Near the bottom make a door (*e*), three inches high, and five inches broad, that leads to the ash-hole. 3. Above this door, and at the height of six inches from the basis, make another door (*f*), of the figure of a segment of a circle, four inches broad at its basis, and three inches and a half high in the middle. 4. Then fasten three iron plates on the forepart of this furnace. Let the first of them (*gg*), eleven inches long and half an inch high, be fastened, so that its lower edge shall rest against the bottom of the furnace, with three or four rivets; and in such a manner, that there may be between the upper edge of the said plate and the side of the furnace a groove so wide, as that the sliders of the lower door (*kk*) may be put into it, and freely move backwards and forwards therein: these must be made of a thicker iron-plate. The second iron-plate (*bb*), eleven inches long, three inches high, and perfectly parallel to the foregoing plate, must be fastened in the space between the two doors, in such manner that both the upper and the lower edges of it may form a hollow groove with the side of the furnace. One of these grooves, which is turned downwards, serves to receive the upper edge of the sliders that shut the lower door (No. 2). The other, that turns upwards, is to receive the inferior edges of the sliders of the small door above (No. 3). The third plate (*ii*), which is like the first, must be rivetted close above the upper door, in such manner, that it may form a groove turning downwards, and contiguous to the upper edge of the upper door (No. 3.) 5. In order to shut both doors (No. 2, 3.), you must adapt to each of them two sliders made of iron-plates, that may move within the above-mentioned grooves (*kk, ll*). But the two sliders belonging to the upper door (No. 3.) must have each a hole near the top; that is, one a small hole one fifth part of an inch broad, and one inch and a half long (*m*); and the other a semicircular aperture, one inch high and two inches broad (*n*). [Let, besides, each slider have a handle, that they may be laid hold of when they are to be moved. 6. Moreover, let five round holes, one inch broad, be bored in the furnace; two of which must be made in the fore-part of the furnace (*oo*), two others in the back part; all at the height of five inches from the bottom, but three inches and a half distant from each side of the furnace; and, finally, a fifth hole (*p*), at the height of one inch above the upper edge of the upper door (*f*). 7. In short, let the inside of the furnace be armed with iron-hooks, jetting out half an inch, and about three inches distant from each other, to fasten the lute with which the furnace is to be covered over within. 8. Let then an iron, moveable, hollow, quadrangular pyramid (*g*), three inches high, be adapted to the upper

aperture (*d*) of the furnace, at the basis seven inches broad, ending upwards in a hollow tube (*r*), three inches in diameter, two inches high, almost cylindrical, though somewhat convergent at top. This prominent tube serves to support a funnel or flue, which is almost cylindrical, hollow, made of iron plates, and two feet high; and which, when a very strong fire is required, is put perpendicularly upon the shorter tube, in such a manner, that it enters close into it, one inch and a half or two inches deep, and may again be taken off at pleasure, when there is no need of so strong a fire. But this pyramidal cover (*q*) must besides have two handles (*ss*) adapted to it, that it may be laid hold of, and thus be taken away or put on again: and that this, being put on the aperture (*d*) of the furnace, may not be easily thrown down, let an iron plate be rivetted to the right and left upper edge of the furnace (*cc*), and be turned down towards the inside, so as to make a furrow open before and behind, into which the lateral edges of the cover may enter and be fastened, and at pleasure be moved backwards and forwards, whenever it must be put on, or moved. 9. Let a square ledge, made of a thick iron-plate, be fastened at top of the upper edge of the lower door (*e*): this is designed to support the grate and the lute; but it must be made of two pieces, that it may be easily introduced into the cavity of the furnace. Thus you will have an assay-oven, which must afterwards be covered over on the inside with lute. This you are to do as follows:

That the fire may be better confined, and that the iron may not be destroyed by growing red-hot, the whole inside of the furnace must be covered over with lute, one finger or one finger and a half thick. The lute fit for this is described under the article CHEMISTRY, n° 604, 605. But before you cover the inside of your furnace with this lute, you must first put within the furnace small iron bars, equal in length to the diameter of the oven, quadrangular, prismatical, half an inch thick, having their extremities supported by a square iron ledge, and three fourths of an inch distant from each other; and you must fasten them so, that their flat sides may be oblique with regard to the transverse section of the furnace, and that the two opposite angles may look one upwards and the other downwards: the bars must not be laid flat, but edgewise; by which situation you hinder the ashes of the fuel of the fire from being detained too long between the interstices of the said iron-bars, and from making an obstruction that would oppose the free draught of the air. The furnace being then covered over with lute, and dried up by a gentle heat, is at last fit for docimastical operations, and especially for such as must be performed in the assay-oven.

If then an operation is to be made in the furnace hitherto described, you must let through the four lower holes above described of the furnace (*oo*) placed before and behind, and directly opposite to each other, two iron-bars one inch thick, and long enough that their extremities on every side may jut out of the holes a small matter. These serve to support the muffle and its bottom. You then introduce the muffle through the upper aperture of the furnace (*d*), and place it upon the above described iron-bars, in such a manner, that the open fore-side of it be contiguous to the in-

Furnace.

ward

Furnace. ward border of the upper door (*f*). The fuel of the fire is introduced through the top of the furnace (*d*); the cover of which (*g*), on this account, must be moveable, and not very heavy. The best fuel for the fire is charcoal made of the hardest wood, especially of beech, broken into small pieces of the bigness of an inch, wherewith the muffle must be covered over some inches high. We then reject larger bits of coals, because they cannot fall through the narrow interstices, between the sides of the muffle and those of the furnace, and cannot of course sufficiently surround the circumference of the muffle. Whence it happens, that there are on every side places void of fuel, and the fire is either not strong enough or unequal. But if, on the contrary, you use coals too small, then a great part fall immediately through the interstices of the grate into the ash-hole; and the tenderest particles of them turn too soon into ashes, and, by increasing the heap of ashes, obstruct the free draught of the air, which is here greatly requisite.

A perfect management of the fire is most commonly necessary in the performing of operations in this furnace; therefore the chemical reader must give attention to what follows. If the door of the ash-hole (*e*) is quite open; and the sliders of the upper door (*f*) drawn towards each other, so as to touch one another in the middle of the door; and if, besides, the cover (*g*), and the funnel adapted to its tube (*r*), is upon the top (*q*) of the furnace; the fire will be then in the highest degree possible; though, in the mean time, it is hardly ever necessary to put the funnel on, except in a very cold season: but if, after having disposed the furnace in the manner just described, you put red burning coals into the open upper door (*f*) of it, the fire is still more increased thereby: however, this artifice is never, or very seldom, necessary. When you shut the upper door with only that slider that has a narrow oblong hole in it (*m*), then the heat becomes a little less; but it diminishes still more when you shut the door with the other slider that has in it the semicircular hole (*n*), which is larger than that of the first slider: nay, the heat again is less when you take away the funnel put at the top of the cover: finally, the door of the ash-hole being either in part or totally shut, the heat is still diminished; because the draught of air so necessary to excite the fire, is thereby hindered: but if, besides all these, you likewise open the upper door quite, then the cold air, rushing into the muffle, cools the bodies put under it, that are to be changed, to a degree never required in any operation, and such as will entirely hinder the boiling of lead. If, during the operation, the fire begins to decay, or to grow unequal, it is a sign that there are places void of coals between the sides of the furnace and those of the muffle: therefore, in this case, you must stir your coals on every side with an iron-rod, which is to be introduced through the upper hole (*p*) of the furnace, that they may fall together, and thus act in a proper manner and equality.

However, you are to observe concerning the regimen of the fire just described, that though the apparatus is made with all the exactness mentioned, nevertheless the effect does not always answer it. The cause of which difference has most commonly its origin in the various dispositions of the air: for as every fire is more excited by coals in proportion as the air, more

condensed, and more quickly agitated, strikes them more violently (which the effect of the bellows plainly shows); it thence appears, that in warm and wet weather, when the atmosphere is light, the fire must be less efficacious in furnaces; that likewise, when several furnaces, situated near each other, are burning at the same time, the fire is in part suffocated, because the ambient air is thereby rendered more rare and lighter. The same effect is produced by the sun, especially in summer-time, when it shines upon the place where the furnace is situated. The atmosphere, on the contrary, being heavier in cold dry weather, excites a very great fire.

The heat of the fire acts the stronger upon the bodies to be changed, as the muffle put in the furnace is less; as the said muffle has more and larger segments cut out of it; as the sides of this muffle are thinner; in short, as there are more vessels placed in the hinder part of the muffle; and on the contrary. In this case, when many of the conditions requisite for the exciting of fire are wanting, then indeed the artificer, with all his skill, will hardly be able to excite the fire to a sufficient degree, in order to perform operations well, in common assay-ovens, even though he uses bellows, and puts coals into the upper door of the furnace. For this reason, the grate ought to be put almost three inches below the muffle, lest the air, rushing through the ash-hole, should cool the bottom of the muffle, which happens in common assay-ovens; and again, that the smaller coals, almost already consumed, and the ashes, may more easily fall through the interstices of the grate, and the larger coals still fit to keep up the fire be retained. Lastly, The above-mentioned funnel is added, that the blowing of the fire being, by means of it, increased as much as possible, this might at last be carried to the requisite degree; for the fire may always be diminished, but not always be increased at pleasure, without the assistance of a proper apparatus.

Fig. 2. Represents a longitudinal section of a *Reverberatory FURNACE* used in the smelting of ores. 1. The masonry. 2. The ash-hole. 3. A channel for the evaporation of the moisture. 4. The grate. 5. The fire-place. 6. The inner part of the furnace. 7. A basin formed of sand. 8. The cavity where the melted metal is. 9. A hole through which the scoria is to be removed. 10. The passage of the flame and smoke, or the lower part of the chimney; which is to be carried up to a height of about 30 feet. 11. A hole in the roof, through which the ore is thrown into the furnace. This furnace is 18 feet long, 12 feet broad, and 9½ high.

Fig. 3. Represents a longitudinal section of the *Refining FURNACE*. 1. The masonry of the pillars and walls surrounding the furnace. 2. The channels for carrying off the moisture. 3. Other small channels which join in the middle of the basin. 4. The basin made of bricks. 5. A bed of ashes. 6. The hollow or basin in which the metal is melted and refined. 7. The great flame-hole. 8. The two openings for the entry of the tuyeres of the bellows. 9. The vault or dome of the furnace. 10. The fire-place. 11. The grate. 12. The draught-hole. 13. A hole in the vault, which, being opened, serves to cool the furnace.

Portable FURNACE. See CHEMISTRY, no 600, &c.

Melting.

Furnace.

Furnace.

Melting FURNACE. See CHEMISTRY, n° 2d 605, 606.*Lamp FURNACE.* *Ibid.* 611.

Machines for Blowing Air into FURNACES. The earliest method of animating large fires in the furnaces where ores were smelted, seems to have been by exposing them to the wind. Such was the practice of the Peruvians before the arrival of the Spaniards among them. Alonso Barba relates, that their furnaces, called *guairas*, were built on eminences, where the air was freest; that they were perforated on all sides with holes, through which the air was driven in when the wind blew, which was the only time when the work could be carried on; that under each hole was made a projection of the stone-work, on which were laid burning coals, to heat the air before it entered the furnace. Some authors speak of several thousands of these *guairas* burning at once on the sides and tops of the hills of Potosi; and several remains of this practice are to be found in different parts of Great Britain.

This method of supplying air being found excessively ineffectual and precarious, the instruments called *bellows* succeeded. These were at first worked by the strength of men; but as this was found to be very laborious and expensive, the force of running water was employed to give motion to these machines. Thus a much greater quantity of metal could be procured than formerly, and the separation was likewise more complete; inasmuch, that in many places the slags or cinders from which the iron had formerly been extracted were again used as fresh ore, and yielded plenty of metal.

But though this method was found to be greatly preferable to the others, yet great improvements were still wanted. In order to melt very large quantities of ore at a time, it was necessary to use bellows of an immense size; and in proportion to their size they stood in need of the more frequent and expensive repairs. The oil, also, which the bellows required in large quantity, becoming rancid, was found to generate a kind of inflammable vapour, which sometimes burst the bellows with explosion, and thus rendered them totally useless. A new method, therefore, of blowing up fires altogether free from the abovementioned inconveniences, was fallen upon by means of water. It depends on the following principle, viz. That a stream of water, running through a pipe, if by any means it is mixed with air at its entrance into the pipe, will carry that air along with it, and part with it again as soon as it comes out of the pipe; and if the air is then collected by a proper apparatus, it may with success be used for exciting the most violent degrees of heat.

Machines of this kind are represented on Plate CCIV. fig. 4. In the right-hand machine, AB represents a stream of water falling into the funnel, whose throat is contracted at B; after which the stream runs through the perpendicular pipe EF, in the upper part of which there are some small holes represented by *cdef*. Thro' these holes the air has access to mix itself with the descending water, which being dashed against the sides of the pipe is reduced to froth, and thus fills the whole cavity of the pipe EF, which is considerably larger than the throat of the funnel B. When this frothy stream enters the vessel C, the air extricates itself from the water; and as it cannot return through the pipe EF because it is continually filled with a stream of li-

quid matter, it flies off with considerable force through the smaller pipe D, by which it is conveyed to the furnace.

From this description, it is evident that the principal thing to be kept in view in the construction of these machines is, to mix the descending stream of water with as great a quantity of air as possible. For this purpose the contrivance represented in the left-hand machines answers much better than the former. By this the water descending from the reservoir A, falls into a kind of cullender B, perforated with a great number of holes in its sides. Thus the water being forced out in a number of small streams is very effectually dashed against the sides of the wide descending pipe, when it enters the condensing vessel C, and is sent off by the pipe D, as in the former.

In some machines of this kind the constructors seem to have been of opinion, that a great height was required in the water-fall; but Dr Lewis, who hath made a great number of experiments upon the subject, shows, that an excess in height can never make up for a deficiency in the quantity of the water. Four or five feet, he thinks, is a sufficient height for the water-fall; where there is a greater height, however, it may be rendered useful, by joining two or more machines together in the manner represented in the plate; where the water, after having once emitted its air in the condensing vessel C, flows out into a new reservoir E. From thence it descends through another cullender F, and descending from it into a condensing vessel G, the air is extricated, and carried off through the pipe H. The upper figure represents the cullender, with the shapes of the holes and their proportional distances, according to Dr Lewis.

Thus, with very little expence, where there is a sufficient quantity of water, as strong a blast of air as can be desired may be readily obtained; for several machines may be constructed, and joined together in a manner somewhat similar to that above mentioned, until all the quantity of water is employed. It is proper to observe, however, that as by this method the air is loaded with moisture, it is proper to make the condensing vessel as high as conveniently may be, that the air may arrive at the furnace in as dry a state as possible.—The long slender pipes in the left-hand machines represent a gage filled with mercury or water, by which the strength of the blast may be determined.

In the large iron founderies another method is used for blowing up the fires by means of a kind of air-pumps. These consist of cast-iron cylinders of about three feet diameter, exactly fitted with a piston moved up and down by means of a water-wheel. In the bottom of the cylinder is a large valve like that of a bellows, which rises as the piston is lifted up, and thus admits the air into the cavity of the cylinder from below. Immediately above the bottom is a tube which goes to the furnace; and as it proceeds from the cylinder is furnished with a valve opening outward. Thus, when the piston is drawn up, the valve in the bottom rises and admits the air that way into the cylinder; while the lateral valve shuts, and prevents any air from getting into it through the pipe. When the piston is thrust down, the valve in the bottom shuts, while the air being compressed in the cavity of the cylinder is violently forced out through the lateral tube into the

Furnace.

Furor,
Furr.

the furnace. In the great foundry at Carron, four of these large cylinders were a few years ago employed at their principal furnace, and so contrived that the strokes of the pistons, being made alternately, produced an almost uninterrupted blast. Some little intermission might indeed be perceived by the ear, but it was too trifling to produce any sensible effect on the heat of the furnace. Even this could have been prevented by means of a large reservoir into which all the four cylinders might discharge their blast. This should be furnished with an heavy piston; whose weight being supported by the air of the cylinder alone, would force it out through its lateral tube in a manner perfectly equable, without any of that puffing or interruption in the blast, perceptible though but in a small degree in the other.

FUROR UTERINUS, a disorder peculiar to women. See MEDICINE-Index.

FURR, in commerce, signifies the skin of several wild beasts, dressed in alum with the hair on; and used as a part of dress, by princes, magistrates, and others. The kinds most in use are those of the ermine, sable, castor, hare, coney, &c. See MUSTELA.

It was not till the later ages that the furs of beasts became an article of luxury. The more refined nations of ancient times never made use of them: those alone whom the former stigmatized as barbarians were clothed in the skins of animals. Strabo describes the Indians covered with the skins of lions, panthers, and bears; and Seneca; the Scythians clothed with the skins of foxes and the lesser quadrupeds. Virgil exhibits a picture of the savage Hyperboreans, similar to that which our late circumnavigators can witness to in the clothing of the wild Americans, unseen before by any polished people.

*Gens effrena virum Rhiphae tunditur Euro;
Et pecudum fulvis volantur corpora setis.*

Most part of Europe was at this time in similar circumstances. Cæsar might be as much amazed with the skin-dressed heroes of Britain, as our celebrated Cook was at those of his new-discovered regions. What time hath done to us, time, under humane conquerors, may effect for them. Civilization may take place; and those spoils of animals, which are at present essential for clothing, become the mere objects of ornament and luxury.

It does not appear that the Greeks or old Romans ever made use of furs. It originated in those regions where they most abounded, and where the severity of the climate required that species of clothing. At first it consisted of the skins only, almost in the state in which they were torn from the body of the beast; but as soon as civilization took place, and manufactures were introduced, furs became the lining of the dress, and often the elegant facing of the robes. It is probable that the northern conquerors introduced the fashion into Europe. We find, that about the year 522, when Totila king of the Visigoths reigned in Italy, the Suethons (a people of modern Sweden) found means, by help of the commerce of numberless intervening people, to transmit, for the use of the Romans, *saphilinas peller*, the precious skins of the sables. As luxury advanced, furs, even of the most valuable species, were used by princes as linings for their tents: thus Marco Polo, in 1252, found those of the Cham

of Tartary lined with ermines and sables. He calls the last *Zibelines* and *Zambolines*. He says that those and other precious furs were brought from countries far north; from the *land of Darkness*, and regions almost inaccessible by reason of morasses and ice. The Welsh set a high value on furs as early as the time of Howel Dda, who began his reign about 940. In the next age, furs became the fashionable magnificence of Europe. When Godfrey of Boulogne and his followers appeared before the emperor Alexis Comnene, on their way to the Holy Land, he was struck with the richness of their dresses, *tam ex ostro quam aurifrigio et niveo opere harmelino et ex mardrino grifioque et vario*. How different was the advance of luxury in France from the time of their great monarch Charlemagne, who contented himself with the plain fur of the otter! Our Henry I. wore furs; yet in his distress was obliged to change them for warm Welsh flannel. But in the year 1337 the luxury had got to such a head, that Edward III. enacted, that all persons who could not spend a hundred a-year should absolutely be prohibited the use of this species of finery. These, from their great expence, must have been foreign furs, obtained from the Italian commercial states, whose traffic was at this period boundless. How strange is the revolution in the fur-trade! The north of Asia at that time supplied us with every valuable kind; at present we send, by means of the possession of Hudson's Bay, furs, to immense amount, even to Turkey and the distant China.

New Voyages in Search of FURRS. During the late Captain Cook's last voyage to the Pacific Ocean, besides the various scientific advantages to be derived from it, a new source of wealth was laid open to future navigators, by trading for furs of the most valuable kind on the north-west coast of America. The first vessel which engaged in the new branch of trade pointed out by that great navigator, was equipped by some gentlemen in China. She was a brig of 60 tons and 20 men, commanded by James Hanna. She sailed from the Tyra the end of April 1785; proceeded to the northward, along the coast of China; passed through Diemen's Straits, the south end of Japan; and arrived at Nootka in August following. Soon after her arrival, the natives, whom Captain Cook had left unacquainted with the effects of fire-arms, tempted probably by the diminutive size of the vessel (scarce longer than some of their own canoes) and the small number of her people, attempted to board her in open day; but were repulsed with considerable slaughter. This was the introduction to a firm and lasting friendship. Captain Hanna cured such of the Indians as were wounded; an unreserved confidence took place; they traded fairly and peaceably; a valuable cargo of furs was procured; and the bad weather setting in, he left the coast in the end of September, touched at the Sandwich Islands, and arrived at Macao the end of December of the same year.

Captain Hanna sailed again from Macao in May 1786, in the snow Sea-Otter of 120 tons and 30 men, and returned to Macao in February 1787. In this second voyage he followed his former track, and arrived at Nootka in August; traced the coast from thence as far as 53 degrees, and explored the extensive found discovered a short time before by Mr Strange.

Furr.

Furr.

and called by him Queen Charlotte's Sound, the latitude of which is 51 degrees north, longitude 128 west.

The snow Lark, Captain Peters, of 220 tons and 40 men, sailed from Macao in July 1786. Her destination was Kamtschatka (for which she was provided with a suitable cargo of arrack, tea, &c.), Copper Islands, and the N. W. coast. Captain Peters, was directed to make his passage between Japan and Corea, and examine the islands to the north of Japan, said to be inhabited by hairy people; which, if Captain Cook had lived, would not have been left to the French to determine. No account having been received of this vessel since her departure, there is every reason to fear she has perished.

In the beginning of 1786, two coppered vessels were fitted out at Bombay, under the direction of James Strange, Esq; who was himself a principal owner. These vessels were, the snow Captain Cook of 300 tons, and snow Experiment of 100 tons. They proceeded in company from the Malabar coast to Batavia; passed through the Straits of Macassar, where the Experiment was run upon a reef, and was obliged to haul ashore upon Borneo to repair; from thence they steered to the eastward of the Palaos Islands; made Sulphur Island; and arrived at Nootka the end of June following. From Nootka, where they left their surgeon's mate (Mackay) to learn the language and collect skins against their intended return (but who was brought away in the Imperial Eagle the following year), they proceeded along the coast to Queen Charlotte's Sound, of which they were the first discoverers; from thence in a direct course to Prince William's Sound. After some stay there, the Experiment proceeded to Macao (their vessels being provided with passes by the governor-general of Goa): the Captain Cook endeavoured to get to Copper Island, but without success, being prevented by constant west winds.

Two coppered vessels were also fitted out by a society of gentlemen in Bengal, viz. the snow Nootka of 200 tons, and the snow Sea Otter of 100 tons, commanded by John Meares and William Tipping, lieutenants in the royal navy. The Nootka sailed in March 1786 from Bengal; came through the China Seas; touched at the Bassees, where they were very civilly treated by the Spaniards, who have taken possession of these islands; arrived at Oonalaska the beginning of August; found there a Russian galliot and some furriers; discovered accidentally near Cape Greville a new strait into Cook's River, 15 leagues wide and 30 long; saw some Russian hunters in a small bay between Cape Elizabeth and Cape Bear; and arrived in Prince William's Sound the end of September. They determined wintering in Snug Corner Cove, lat. 60. 30. in preference to going to the Sandwich Islands, which seem placed by Providence for the comfort and refreshment of the adventurers in this trade, and were frozen up in this gloomy and frightful spot from the end of November to the end of May. By the severity of the winter they lost their third and fourth mates, surgeon, boatswain, carpenter, and cooper, and twelve of the fore-mast men; and the remainder were so enfeebled as to be under the necessity of applying to the commanders of the King George and Queen Charlotte, who just at this time arrived in the sound, for some hands to assist in carrying the ves-

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fel to the Sandwich Islands, where, giving over all further thoughts of trade, they determined (after getting a sea-stock of fish off Cape Edgcombe) immediately to proceed. The Nootka arrived at Macao the end of October 1787.

The Imperial Eagle, Captain Barkley, fitted out by a society of gentlemen at Ostend, sailed from Ostend the latter end of November 1786; went into the bay of All Saints; from thence, without touching any where, to the Sandwich Islands, and arrived at Nootka the beginning of June; from thence to the south, as far as 47° 30', in which space he discovered some good and spacious harbours. In the lat. of 47° 46', lost his second mate, purser, and two seamen, who were upon a trading party with the long-boat, and imprudently trusting themselves ashore unarmed, were cut off by the natives. This place seems to be the same that Don Antonio Mourelle calls the *Ilha de los Dolores*, where the Spaniards going ashore to water, were also attacked and cut off.

The King George of 320, and the Queen Charlotte of 200 tons, commanded by Captains Portlock and Dixon, who served under Captain Cook in his last voyage, were fitted out by a society of gentlemen in England, who obtained a privilege to trade to the north-west coast of America, from the South-Sea and East India companies.

Those vessels sailed from England the beginning of September 1785; touched at the Falkland Islands, Sandwich Islands, and arrived in Cook's River in the month of August. From thence, after collecting a few furs, they steered in the end of September for Prince William's Sound, intending, it is said, to winter there; but were prevented entering, by heavy storms and extreme bad weather, which obliged them to bear away, and seek some other part of the coast to winter at. The storms and bad weather accompanied them till they arrived off Nootka Sound, when they were so near the shore, that a canoe came off to them; but though thus near accomplishing their purpose, a fresh storm came on, and obliged them finally to bear away for the Sandwich Islands, where they remained the winter months; and returning again to the coast, arrived in Prince William's Sound the middle of May. The King George remained in Prince William's Sound; and during her stay, her long-boat discovered a new passage from the Sound into Cook's River. The Queen Charlotte proceeded along the coast to the south; looked into Behring's Bay, where the Russians have now a settlement; examined that part of the coast from 56 to 50°, which was not seen by Captain Cook, and which consists of a cluster of islands, called by Captain Dixon *Queen Charlotte's Islands*, at a considerable distance from the Main, which is thus removed farther to the eastward than it was supposed to be: some part of the continent may, however, be seen from the east side of these islands; and it is probable, the distance does not any where exceed 50 leagues. On this estimation, Hudson's House, lat. 53° long. 106° 27' west, will not be more than 800 miles distant from that part of this coast in the same parallel. It is therefore not improbable, that the enterprising spirit of our Canadian furriers may penetrate to this coast (the communication with which is probably much facilitated by lakes or rivers), and add to the comforts and luxu-

Furr.

Furr. ries of Europe this invaluable furr, which in warmth, beauty, and magnificence, far exceeds the richest furs of Siberia. Queen Charlotte's islands are inhabited by a race of people differing in language, features, and manners, from all the other tribes of this coast. Among other peculiarities, they are distinguished by a large incision in the under lip, in which is inserted a piece of polished wood, sometimes ornamented with mother-of-pearl shell, in shape and size like a weaver's shuttle, which undoubtedly is the most effectual mode of deforming the human face divine that the ingenious depravity of taste of any savage nation has yet discovered. These ships, after disposing of their furs in China, were loaded with teas on account of the English company, sailed from Wampoa the end of February, and arrived in England a short time since, after an absence of three years.

The year after the departure of the King George and Queen Charlotte, the same society to which they belonged fitted out two other vessels, viz. the Princess Royal of 60 tons, and the Prince of Wales of 200 tons, commanded by Captains Colnet and Duncan, the former of whom had served under Captain Cook. These vessels left England in August 1786; touched at New Year's harbour on Staten Land, where they left an officer and 12 men to kill seals against the arrival of a vessel which was to follow them from England; from thence they proceeded directly to Nootka, where they arrived the 6th of July, sickly and in bad condition, and found here the Imperial Eagle, which had left Europe some months after them. Leaving Nootka, they steered along the shore to the northward, and soon after fell in with the Queen Charlotte.

In the beginning of 1788, Captain Mears sailed again with two other vessels, the Felice, which he commanded himself, and the Iphigenia, Captain Douglas, to Nootka Sound. Here he purchased of the chief of the district a spot, on which he built a house for his residence and more convenient intercourse with the natives, hoisting the British colours thereon, surrounding it with a breast-work, and mounting a sentry pounder on the front. Having so done, he sent Mr Douglas in the Iphigenia to trade along the northern coast, while he himself proceeded to the south; and by presents to the chiefs obtained the ports Cox and Effingham, and the promise of an exclusive trade with the natives of the district, and also some other places, which he took possession of in the name of the king. Captain Douglas likewise, by presents to the chiefs of the countries he visited, obtained similar privileges, no other European vessel having sailed there before him.

On their return to Nootka, they found a vessel finished which the commander had laid down before his departure. This, which he named the North-west America, he left at Nootka with the Iphigenia, while he sailed with a cargo of furs in the Felice to China.

A few days after his arrival at China, two vessels, the Prince of Wales and Princess Royal, came to Canton from their trading voyage above mentioned. Captain Mears, fearing a competition of interests might be injurious to both parties, proposed a copartnership,

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which was mutually agreed to; and another ship was purchased by the firm, and called the *Argonaut*. In the month of April 1789, Captain Mears gave Mr Colnet the command of the Princess Royal and Argonaut, which were loaded with stores and articles estimated sufficient for three years trade, besides several artificers, and near 70 Chinese, who intended to become settlers on the north-west coast of America, under protection of the new company.

In the mean while, the Iphigenia, and North-west America (the vessel built at Nootka) having wintered in Sandwich Islands, returned to Nootka in the latter end of April. Soon after which, two Spanish ships of war, under the command of Don Martinez, anchored in the sound. For a few days mutual civilities passed between the Spanish captain and Mr Douglas; but at the end of about a week, Don Martinez summoned the latter on board his own ship the Princessa, telling him he was his prisoner, and that the king of Spain had commanded him, Don Martinez, to seize all vessels he should find on that coast. He therefore instructed his officers to take possession of the Iphigenia, which they accordingly did in the name of his Catholic majesty; and the officers and crew were conveyed as prisoners on board the Spanish ships, where they were put in irons, and otherwise ill treated. Immediately after this, Don Martinez took possession of the little settlement, hoisting the standard of Spain, and modestly declaring all the lands from Cape Horn to 60 degrees north latitude belonged to his master. To aggravate the insult, he forcibly employed the crew of the Iphigenia in building batteries, &c. and offered no kind of violence to two American vessels that were at the same time in the harbour. At this time the North-west America was sent to explore the Archipelago of St Lazarus. On her return to Nootka she met with a similar treatment, and the skins she had collected were seized, with the rest of her cargo.

A few days after the Princess Royal (which we have mentioned as leaving Canton in company with the Argonaut) arrived. The Spanish commander, for reasons that do not appear, suffered her to depart. The skins collected by the North-west America were shipped on board her for the benefit of her owner, and she proceeded to trade in the neighbouring isles. On the 3d of July, the Argonaut arrived at the Sound; and Don Martinez, after making every profession of civility to Mr Colnet the commander, took possession of the said ship in the name of his master, and made prisoners of the crew. Soon after, the Princess Royal returning to receive instructions from Mr Colnet, director of the Enterprize, was seized by the Spanish captain.

The crews of the British vessels were differently disposed of; some sent to China by the American vessels, and others to Spanish America: but the Chinese were all detained, and employed in the mines which were opened on the lands purchased by Captain Mears. What these mines consisted of we are no where informed. Mr Colnet was so much affected at the failure of the enterprize as to be deprived of reason.

This, as soon as known, occasioned a spirited representation from the British court to that of Spain; at the same time that vigorous preparations were made

Furten-
burgh
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Fusée

for war in case adequate satisfaction should be refused. Matters, however, were prevented from coming to extremities, by a compliance on the part of Spain, after many delays and much artifice of negotiation, with the requisitions of Britain: in consequence of which, among other advantages unnecessary to be here recited, the whole trade from California to China is completely laid open; and the British allowed the full exercise of navigation and commerce in those parts of the world which were the subject of discussion.

In some accounts of the voyages above mentioned, the furr-trade in those parts have been greatly magnified. In that published by Captain Portlock, however, this officer observes, that the gains hitherto have certainly not been 'enviously' great; though the merchants have no doubt found the trade lucrative.

FURSTENBURGH, a town and castle of Germany, the capital of a county of the same name, 30 miles north-west of Constance. E. Long. 8. 30. N. Lat. 47. 50.

FURTHCOMING, in law, the name of an action competent to any person who has used arrestment in the hands of his debtor's creditor, for having the subject arrested declared his property.

FURUNCULE, or BOIL, in surgery, a small resisting tumor, with inflammation, redness, and great pain, arising in the adipose membrane, under the skin. See SURGERY.

FURZE, in botany. See ULEX.

FUSANUS, in botany: A genus of the monœcia order, belonging to the polygamia class of plants. The hermaphrodite calyx is quinquefid; there is no corolla; there are four stamina; the germen beneath; there are four stigmata; the fruit a plum.

FUSAROLE, in architecture, a moulding or ornament placed immediately under the echinus, in the Doric, Ionic, and Composite capitals.

FUSE or FUZE, in artillery. See FUSEE.

FUSEE, in clock-work, is that conical part drawn by the spring, and about which the chain or string is wound; for the use of which, see CLOCK and WATCH.

FUSEE, or Firelock. See MUSQUET.

FUSEE, Fuze, or Fuse, of a bomb or grenado, is that which makes the whole powder or composition in the shell take fire, to do the designed execution.

Fuzes are chiefly made of very dry beech-wood, and sometimes of hornbeam, taken near the root. They are turned rough, and bored at first, and then kept for several years in a dry place; the diameter of the hole is about $\frac{1}{8}$ th of an inch; the hole does not come quite through, leaving about $\frac{1}{8}$ th of an inch at the bottom; and the head is made hollow, in the form of a bowl.

The composition for fuzes is saltpetre 3, sulphur 1, and mealed powder 3, 4, and sometimes 5. This composition is drove in with an iron-driver (whose ends are capped with copper to prevent the composition from taking fire), and equally hard as possible; the last shovel-full being all mealed powder, and two stands of quickmatch laid across each other being drove in with it, the ends of which are folded up into the hollow top, and a cap of parchment tied over it till used.

When these fuzes are driven into the loaded shell, the lower end is cut off in a slope, so that the compo-

sition may inflame the powder in the shell: the fuze must have such a length as to continue burning all the time the shell is in its range, and to set fire to the powder as soon as it touches the ground, which instantly bursts into many pieces. When the distance of the battery from the object is known, the time of the shell's flight may be computed to a second or two; which being known, the fuze may be cut accordingly, by burning two or three, and making use of a watch or a string by way of a pendulum to vibrate seconds.

FUSIBILITY, in natural philosophy, that quality of bodies which renders them fusible. Gold is more fusible than iron or copper; but less so than silver, tin, and lead. Borax is frequently mixed with metals, to render them more fusible.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and sharp than the other two in the middle. It is called in Latin *fusus*, "a spindle," from its shape.

FUSILIERS, FUSILIERS, or *Fuzileers*, in the military art, are soldiers armed as the rest of the infantry, but wearing caps like the grenadiers, though somewhat shorter. There are three regiments in the British service: the royal regiment of Scots fuzileers raised in 1678; the royal regiment of English fuzileers raised in 1685; and the royal regiment of Welsh fuzileers raised in 1688-9.

FUSION, the state of a body rendered fluid by fire. See FLUIDITY, and CHEMISTRY-Index.

FUST, or FAUSTUS, a citizen of Mentz, and one of the earliest printers. He had the policy to conceal his art; and to this policy we are indebted for the tradition of "The Devil and Dr Faustus," handed down to the present times. Fust, in partnership with Peter Schoeffer, having in 1462 printed off a considerable number of copies of the Bible to imitate those which were commonly sold in MS. Fust undertook the sale of them at Paris, where the art of printing was then unknown. At first he sold his copies for so high a sum as 500 or 600 crowns, the prices usually demanded by the scribes. He afterwards lowered his price to 60 crowns, which created universal astonishment: but when he produced copies as fast as they were wanted, and lowered the price to 30 crowns, all Paris was agitated. The uniformity of the copies increased the wonder; informations were given into the police against him as a magician; his lodgings were searched; and a great number of copies being found, they were seized: the red ink with which they were embellished was said to be his blood; it was seriously adjudged that he was in league with the devil; and if he had not fled, most probably he would have shared the fate of those whom ignorant and superstitious judges condemned in those days for witchcraft. See (History of) PRINTING.

FUSTIAN, in commerce, a kind of cotton stuff, which seems as it were whaled on one side.

Right fustians should be altogether made of cotton-yarn, both woof and warp; but a great many are made, the warp of which is flax, or even hemp.

There are fustians made of several kinds, wide, narrow, fine, coarse; with shag or nap, and without it.

FUSTIAN, is also used for a bombast style, or a high swelling.

Fusibility
||
Fustian.

Military
Dial. voce
Laboratory.

Fustick
1
Future.

swelling kind of writing made up of heterogeneous parts.

FUSTICK, or FUSTOCK, a yellow wood, that grows in all the Caribbee islands, used in dying yellow. It pays no duty on importation. It is a species of MORUS.

FUSTIGATIO, in the Roman customs, a punishment inflicted by beating with a cudgel. This punishment was peculiar to freemen: for the slaves were scourged or lashed with whips.

FUTTOCKS, in a ship, the timbers raised over the keel, or the encompassing timbers that make her breadth.

FUTURE, something to come hereafter. We say a future state, a future contingency; there is none but God to whom future things are present.

FUTURE, or FUTURE Tense, in grammar, denotes an inflexion of verbs, whereby they denote, that a thing will be in some time yet to come. See GRAMMAR.

FUZES, or FUSEES, in artillery. See FUSEE.

FUZILEERS. See FUSILEERS.

FYTT (John), a celebrated painter of animals and flowers, &c. was born at Antwerp about the year 1625, and proved one of the best artists of his time. He frequently painted in conjunction with Rubens, and Jordaens; and whatever subject he chose to represent in the style which he adopted, was always designed and finished in a masterly manner. His general subjects were live and dead game, wild boars, hares, dogs, fruits, flowers, and birds, particularly partridges; which he described with surprizing truth, nature, and strength. He likewise imitated successfully the bas relieves on vases of marble or porphyry; and gave uncommon freshness to his fruits and flowers; and in objects of the animal kind, he described even the hairs of the animals and the plumage of his fowl with wonderful spirit, exactness, and freedom of pencil.

Fuzes
||
Fytt.

G.

G, THE seventh letter and fifth consonant of our alphabet; though in the alphabets of all the oriental languages, the Hebrew, Phenician, Chaldee, Syriac, Samaritan, Arabic, and even Greek, *G* is the third letter. The Hebrews call it *ghimel* or *gimel*, *g. d.* "camel;" by reason it resembles the neck of that animal; and the same appellation it bears in the Samaritan, Phenician, and Chaldee: in the Syriac it is called *gamel*, in Arabic *gim*, and in Greek *gamma*.

The gamma (Γ) of the Greeks is manifestly the *gimel* (γ) of the Hebrews or Samaritans. All the difference between the gamma and *gimel* consists in this, that the one is turned to the right and the other to the left, according to the different manners of writing and reading which obtained among those different nations; so that all the pains Salmasius has taken on Solinus, to prove that the *G* was derived from the Greek kappa, is lost.

From the Greeks the Latins borrowed their form of this letter; the Latin *G* being certainly a corruption of the Greek gamma Γ , as might easily be shown, had our printers all the characters and forms of this letter which we meet with in the Greek and Latin MSS. through which the letter passed from Γ to *G*.

Diomed, lib. ii. cap. *De Litera*, calls *G* a new letter. His reason is, that the Romans had not introduced it before the first Punic war; as appears from the rostral column erected by C. Duilius, on which we every where find a *C* in lieu of *G*. It was Sp. Carvilius who first distinguished between those two letters, and invented the figure of the *G*; as we are assured by Terentius Scaurus. The *C* served very well for *G*; it being the third letter of the Latin alphabet, as the Γ or γ was of the Greek.

The *G* is found instead of *C* on several medals: *Vaillant, Num. Imperat.* tom. i. p. 39.

M. Beger produces a medal of the *Familia Ogulnia*, where *GAR* is read instead of *CAR*, which is on those of M. Patin. But the *C* is more frequently seen on medals in lieu of *G*; as, *AUGUSTALIS CALLAECIA CARTACINENSIS*, &c. for *AUGUSTALIS*, &c. Not that the pronunciation of those words was altered, but only that the *G* was unartfully or negligently cut by the workmen: as is the case in divers inscriptions of the eastern empire; where *AVC*, *AVCC*, *AVCCC*, are frequently found for *AVG*, &c.

The northern people frequently change the *G* into *V* or *W*; as in *Gallus*, *Wallus*; *Gallia*, *Wallia*, *Vallia*, &c. For in this instance it must not be said that the French have changed the *W* into *G*; because they wrote *Gallus* long before *Wallus* or *Wallia* was known, as appears from all the ancient Roman and Greek writers. And yet it is equally true, that the French change the *W* of the northern nations, and *V* consonant, into *G*; as, *Wilhelmus*, "William," into *Guillaume*; *Wulphilas* into *Gulphilas*; *Vasco* into *Gafcon*, &c.

The letter *G* is of the mute kind, and cannot be any way sounded without the help of a vowel. It is formed by the reflexion of the air against the palate, made by the tongue as the air passes out of the throat; which Martianus Capella expresses thus, *G spiritus cum palato*; so that *G* is a palatal letter.

The modern *G* takes its form from that of the Latins. In English it has two sounds, one from the Greek γ , and the Latin, which is called that of the hard *G*, because it is formed by a pressure somewhat hard on the fore-part of the tongue against the upper gum;

Gabale
||
Gabel.

which sound it retains before *a, o, u, l, r*; as *gate, go, gull*. At the end of a word it is always hard, as *ring, sing, &c.* The other sound, called that of the soft *G*, resembles that of *j*; and is commonly, though not always, found before *e* and *i*, as in *gesture, giant, &c.* To this rule, however, there are many exceptions; *G* is often hard before *i*, as *give, &c.* and sometimes before *e*, as *get, &c.* It is also hard in derivatives from words ending in *g*, as *singing, stronger, &c.* and generally before *er*, at the end of words, as *finger*. *G* is mute before *n*, as *gnash, sign*. *Gh* has the sound of the hard *G* in the beginning of a word, as *ghostly*; in the middle, and sometimes at the end, it is quite silent, as *right, though*. At the end of a word *Gh* has often the sound of *f*, as *laugh, rough, tough*.

As a numeral, *G* was anciently used to denote 400; and with a dash over it thus *Ġ*, 40,000.

As an abbreviation, *G.* stands for *Gaius, Gallius, gens, genius, &c.* *G. G.* for *gemina, gessit, gesserunt, &c.* *G. C.* for *genio civitatis* or *Cæsaris*. *G. L.* for *Gaius libertus*, or *genio loci*. *G. V. S.* for *genio urbis sacrum*. *G. B.* for *genio bono*. And *G. T.* for *genio tutelari*.

In music, *G* is the character or mark of the treble cleff; and from its being placed at the head, or marking the first sound in Guido's scale, the whole scale took the name *gamut*.

GABALE, in mythology, a deity worshipped at Heliopolis under the figure of a lion, with a radiant head; and it is thus represented on many medals of Caracalla.

GABARDINE, from the Italian *gavardina*, has been sometimes used to denote a coarse frock, or mean dress. In this sense it is used by Shakespeare in his *Tempest* and Merchant of Venice, and by Butler in his *Hudibras*, book i.

GABARA, or GABBARA, in antiquity, the dead bodies which the Egyptians embalmed, and kept in their houses, especially those of such of their friends as died with the reputation of great piety and holiness, or as martyrs. See EMBALMING, and MUMMY.

GABEL (*Gabella, Gablum, Gablegium*), in French *Gabelle*, i. e. *Veſtigal*, hath the same signification among the ancient English writers that *gabelle* hath in France. It is a tax; but hath been variously used, as for a rent, custom, service, &c. And where it was a payment of rent, those who paid it were termed *gabellatores*. When the word *gabel* was formerly mentioned without any addition to it, it signified the tax on salt, tho' afterwards it was applied to all other taxes.

In the French customs, the gabel, or tax on salt, computed to make one-fourth of the whole revenue of the kingdom, is said to have had its rise in France in 1286, under Philip the Fair. Philip the Long took a double per livre on salt, by an edict in 1318, which he promised to remit when he was delivered from his enemies; which was renewed by Philip de Valois in 1345; and the duty was raised to four deniers per livre; king John resumed it in 1355, and it was granted to the dauphin in 1358, to ransom king John. It was continued by Charles V. in 1366; after his decease it was suppressed, but revived again by Cha. VI. in 1381. Louis XI. raised it to 12 deniers per livre; and Francis I. in 1542 to 24 livres per muid: and it has been considerably augmented since that time; so

that a minot of salt latterly paid a duty of 52 livres, 8 sols, and 6 deniers. Philip de Valois first established granaries and officers of the gabelles, and prohibited any other persons from selling salt: from which time the whole commerce of salt for the inland consumption continued wholly in the king's hands, every grain thereof being sold and distributed by his farmers and officers created for the purpose.—This very odious and oppressive tax has lately been abolished by the National Assembly.

GABII, (anc. geog.), a town of Latium, midway almost between Rome and Preneste to the east, often mentioned in the history of Tarquin the Proud. *Cinctus Gabinus* denoted a particular way of tucking the gown, by drawing it forwards on the breast, and tying it into a knot; as the people of Gabii did at a solemn sacrifice, on the sudden attack of an enemy, in order to be fitter for action. In this manner the consul used to declare war, to sacrifice, and burn the spoils of the enemy; and then he was said to be *præcinctus*. The place now extinct.

GABINIAN LAWS, in Roman antiquities; laws instituted upon several occasions by persons of the name of *Gabinus*. The first was the *Gabinia lex de Comitibus*, by A. Gabinus the tribune, in the year of Rome 614. It required that in the public assemblies for electing magistrates, the votes should be given by tablets, and not *viva voce*.—Another *de Comitibus*, which made it a capital punishment to convene any clandestine assembly, agreeable to the old law of the 12 tables.—Another *de Militiâ*, by A. Gabinus the tribune, year of Rome 685. It granted Pompey the power of carrying on the war against the pirates during three years, and of obliging all kings, governors, and states, to supply him with all the necessaries he wanted, over all the Mediterranean sea, and in the maritime provinces as far as 400 *stadia* from the sea.—Another *de Usurâ* by Aul. Gabinius the tribune, year of Rome 685. It ordained that no action should be granted for the recovery of any money borrowed upon small interest to be lent upon larger. This was an usual practice at Rome, which obtained the name of *versuram facere*.—Another against fornication.

GABIONS, in fortification, baskets made of osier-twigs, of a cylindrical form, six feet high and four wide; which, being filled with earth, serve as a shelter from the enemy's fire.

GABLE, or GABLE-End, of a house (from *gaval*, Welsh), is the upright triangular end from the cornice or eaves to the top of the house.

GABRES, or GAVRES, a religious sect in Persia and India; called also *Gabres, Guebres, Gevres, Gauris, &c.* See MAGI.

The Turks call the Christians *Gabres*, *q. d.* infidels, or people of a false religion; or rather, as Leunclavius observes, heathens or gentiles: the word *Gabre*, among the Turks, having the same signification as *pagan* or *infidel* among the Christians, and denoting any thing not Mahometan.

In Persia the word has a more peculiar signification; wherein it is applied to a sect dispersed through the country, and said to be the remains of the ancient Persians or followers of Zoroaster, being worshippers of fire. They have a suburb at Isfahan, which is called *Gaurabad*, or "the town of the *Gauris*," where they are

Gabii
||
Gabres

Gabriel
||
Gad.

are employed in the meanest and vilest drudgery: some of them are dispersed through other parts of Persia; but they principally abound in Kerman, the most barren province in the whole country, where the Mahometans allow them liberty and the exercise of their religion. Several of them fled many ages ago into India, and settled about Surat, where their posterity remain to this day. There is also a colony of them at Bombay. They are a poor, ignorant, inoffensive people, extremely superstitious, and zealous for their rites, rigorous in their morals, and honest in their dealings. They profess to believe a resurrection and a future judgment, and to worship only one God. And though they perform their worship before fire, and direct their devotion towards the rising sun, for which they have an extraordinary veneration, yet they strenuously maintain that they worship neither; but that these are the most expressive symbols of the Deity, and that for this reason they turn towards them in their devotional services.—However, some have supposed, that these are Persians converted to Christianity, who, being afterwards left to themselves, mingled their ancient superstitions with the truths and practices of Christianity, and so formed for themselves a religion apart: and they allege, that throughout the whole of their system of doctrine and practice, we may discern the marks and traces of Christianity, though grievously defaced; the annunciation, the magi, the massacre of the infants, our Saviour's miracles, his persecutions, ascension, &c.

GABRIEL, the name of one of the principal angels in heaven. It signifies *the strength of God*. There are a few events, in which this exalted being was concerned, recorded in scripture. He was sent to the prophet Daniel, to explain to him the vision of the ram and goat, and the mystery of the seventy weeks, which had been revealed to him. He was sent to Zecharias, to declare to him the future birth of John the Baptist. Six months after, he was sent to Nazareth to the Virgin Mary, to warn her of the birth of Jesus Christ.

The Orientalists add several particulars to what the scriptures inform us concerning the angel Gabriel. The Mahometans call him *the faithful spirit*; and the Persians, by way of metaphor, *the peacock of heaven*. We read, in the second chapter of the Koran, that *whosoever is an enemy to Gabriel shall be confounded*. It was Gabriel, they believe, who brought to Mahomet their false prophet the revelations which he published; and it was he who conducted him to heaven mounted upon the animal Borak.

GABRIELITES, in ecclesiastical history, a sect of anabaptists that appeared in Pomerania in 1530. They derive their name from Gabriel Scherling; who, after having been for some time tolerated in that country, was obliged to remove, and died in Poland.

GAD (anc. geog.), a district of the Transjordan Palestine, situated between Gilead and the kingdom of Bashan to the north, and the kingdom of the Amorrites to the south; having the Jordan to the west, and bounded by various people on the east; so called from a tribe of that name.

GAD, among miners, a small punch of iron, with a long wooden handle, used to break up the ore.

One of the miners holds this in his hand, directing the point to a proper place, while the other drives it into the vein, by striking it with a sledge-hammer.

GAD-Bee, or **Gad-Fly**. See **OESTRUS**.

GADARA (anc. geog.), a town of the Peræa, or Transjordan, in the Decapolis, a very strong place. Restored by Pompey after its demolition by the Jews (Josephus). After Herod's death it was joined to the province of Syria by Augustus.

GADARENORUM AGER (anc. geog.), the country of the Gadarenes, called by Matthew the country of the Gergesens, because it was a district that lay between Gadara and Gergesa, otherwise called *Gerasa*, both which lay within the Decapolis on the other side Jordan.

GADES, or **GADIRA** (anc. geog.), a small island in the Atlantic, on the Spanish coast, 25 miles from the Columns of Hercules. It was sometimes called *Tartessus* and *Erythia* according to Pliny. Geryon, whom Hercules killed, fixed his residence there. Hercules, surnamed *Gaditanus*, had there a celebrated temple in which all his labours were engraved with excellent workmanship. The inhabitants are called *Gaditani*.

GADUS, in ichthyology, a genus of fishes belonging to the order of jugulares. The head is smooth; there are seven cylindrical rays in the branchiostegic membrane; the body is oblong, with deciduous scales; the whole fins are covered with the common skin of the fish; the rays of the back-fins are blunt, and those of the breast are sharp. There are 17 species, principally distinguished by their cirri and the number of back-fins. The most remarkable are,

1. The *morhua*, or **COMMON COD**, is cinereous on the back and sides, and commonly spotted with yellow: the belly is white; but they vary much, not only in colour, but in shape, particularly that of the head. The side-line is white, and broad, and straight, till it reaches opposite the vent, when it bends towards the tail. Codlings are often taken of a yellow, orange, and even red colour, while they remain among the rocks; but on changing their place assume the colour of other cod-fish. The jaws are of an equal length, and at the end of the lower is a small beard; the teeth are disposed in the palate as well as in the jaws.

The cod is found only in the northern parts of the world; it is, as Rondeletius calls it, an ocean fish, and never met with in the Mediterranean Sea. It affects cold climates, and seems confined between the latitudes 66° and 50°; what are caught north and south of those degrees being either few in quantity or bad in quality. The Greenland fish are small, and emaciated through want of food; being very voracious, and having in those seas a scarcity of provision. This locality of situation is common to many other species of this genus, most of them being inhabitants of the cold seas, or such as lie within regions that can just claim the title of *temperate*. There are nevertheless certain species found near the Canary Islands, called *cherny*, of which we know no more than the name; but which, according to Captain Glas, are better tasted than the Newfoundland kind.

The great rendezvous of the cod-fish is on the banks of Newfoundland, and the other sand-banks that lie off the coasts of Cape Breton, Nova Scotia, and New England. They prefer those situations, by reason of the quantity of worms produced in those sandy bottoms, which tempt them to resort there for food; but another

Gad Bee
||
Gadus.

Gadus.

another cause of the particular attachment the fish have to these spots, is their vicinity to the polar seas, where they return to spawn: there they deposite their roes in full security; but want of food forces them, as soon as the first more southern seas are open, to repair thither for subsistence. Few are taken north of Iceland, but on the south and west coasts they abound: they are again found to swarm on the coasts of Norway, in the Baltic, off the Orkney and the Western Isles; after which their numbers decrease, in proportion as they advance towards the south, when they seem quite to cease before they reach the mouth of the Straits of Gibraltar.

Before the discovery of Newfoundland, the greater fisheries of cod were on the seas of Iceland, and off our Western Isles, which were the grand resort of ships from all the commercial nations; but it seems that the greatest plenty was met with near Iceland. The English resorted thither before the year 1415: for we find that Henry V. was disposed to give the king of Denmark satisfaction for certain irregularities committed on those seas by his subjects. In the reign of Edward IV. the English were excluded from the fishery by treaty; and forbidden to resort there under pain of forfeiture of life and goods. Notwithstanding this, that monarch afterwards gave licence to a ship of Hull to sail to Iceland, and there relade fish and other goods, without regard to any restrictions to the contrary. The right of the English in latter times was far from being confirmed: for we find queen Elizabeth condescending to ask permission to fish in those seas from Christian IV. of Denmark; yet afterwards she so far repented her request, as to instruct her ambassadors at that court to insist on the right of a free and universal fishery. In the reign of her successor, however, they had not fewer than 150 ships employed in the Iceland fishery; which indulgence might arise from the marriage of James with a princess of Denmark. But the Spanish, the French, and the Bretons, had much the advantage of the English in all fisheries at the beginning, as appears by the state of that in the seas of Newfoundland in the year 1578, when the number of ships belonging to each nation stood thus:

Spaniards, 100, besides 20 or 30 that came from Biscay to take whale for train, being about five or six thousand tons.

Portuguese 50, or three thousand tons.

French and Bretons 150, or seven thousand tons.

English, from 30 to 50.

The increase of shipping that resort to those fertile banks is now unspeakable. Britain now enjoys the greatest share; which ought to be esteemed our chiefest treasure, as it brings wealth to individuals, and strength to the state. See FISHERY.

All this immense fishery is carried on by the hook and line only. We have been informed that they fish from the depth of 16 to 60 fathoms, according to the inequality of the bank, which is represented as a vast mountain, under water, above 500 miles long, and near 300 broad; and that seamen know when they approach it by the great swell of the seas and the thick mists that impend over it. The bait is herring, a small fish called a *capelin*, a shell-fish called *clams*, and bits of sea-fowl; and with these are caught fish sufficient to find employ for near 15,000 British seamen, and to af-

ford subsistence to a much more numerous body of people at home, who are engaged in the various manufactures which so vast a fishery demands.

The food of the cod is either small fish, worms, testaceous or crustaceous animals, such as crabs, large whelks, &c.; and their digestion is so powerful as to dissolve the greatest part of the shells they swallow. They are very voracious, and catch at any small body they perceive moved by the water, even stones and pebbles, which are often found in their stomachs.

Fishermen are well acquainted with the use of the air-bladder or found of the cod; and are very dexterous in perforating this part of a live fish with a needle, in order to disengage the inclosed air; for without this operation it could not be kept under water in the well-boats, and brought fresh to market. The founds of the cod salted is a delicacy often brought from Newfoundland. Ifinglass is also made of this part by the Iceland fishermen: a process which deserves the attention of the natives of the north of Scotland, where these fish are plentiful. It is given under the article ICHTHYOCOLLA.

Providence hath kindly ordained, that this fish, so useful to mankind, should be so very prolific as to supply more than the deficiencies of the multitudes annually taken. Leuwenhoeck counted 9,384,000 eggs in a cod-fish of a middling size; a number, sure, that will baffle all the efforts of man, or the voracity of the inhabitants of the ocean, to exterminate, and which will secure to all ages an inexhaustible supply of grateful provision.

In our seas they begin to spawn in January, and deposite their eggs in rough ground among rocks. Some continue in roe till the beginning of April. The cod-fish in general recover quicker after spawning than any other fish; therefore it is common to take some good ones all the summer. When they are out of season, they are thin-tailed and lousy; and the lice chiefly fix themselves on the inside of their mouths.

The fish of a middling size are most esteemed for the table; and are chosen by their plumpness and roundness, especially near the tail, by the depth of the fulcus or pit behind the head, and by the regular undulated appearance of the sides, as if they were ribbed. The glutinous parts about the head lose their delicate flavour after it has been 24 hours out of the water, even in winter, when these and other fish of this genus are in highest season.

One mentioned by Mr Pennant as the largest that he ever heard of taken on our coasts, weighed 78 pounds: the length was five feet eight inches, and the girth round the shoulders five feet. It was taken at Scarborough in 1755, and was sold for one shilling. But the general weight of these fish in the Yorkshire seas, he says, is from 14 to 40 pounds. This species is short in proportion to its bulk, the belly being very large and prominent.

2. The *eglefinus*, or HADDOCK, has a long body; the upper part of a dusky brown colour, and the belly and lower part of the sides silvery: On the back are three fins resembling those of the common cod-fish; the lateral line is black; and the tail is forked: The head slopes down to the nose; on the chin is a short beard; and on each side beyond the gills is a large black spot. Superstition assigns this mark to the impression

Gadus.

Gadus. preffion St Peter left with his finger and thumb when he took the tribute out of the mouth of a fish of this species, which has been continued to the whole race of haddocks ever since that miracle. Large haddocks begin to be in roe in the middle of November, and continue so till the end of January; from that time till May they are very thin-tailed, and much out of season. In May they begin to recover; and some of the middling-sized fish are then very good, and continue improving till the time of their greatest perfection. The small ones are extremely good from May till February, and some even in February, March, and April, viz. those which are not old enough to breed.

The fishermen assert, that in rough weather haddocks sink down into the sand and ooze in the bottom of the sea, and shelter themselves there till the storm is over; because in stormy weather they take none, and those that are taken immediately after a storm are covered with mud on their backs.

A species of Serpula. In summer they live on young herrings and other small fish; in winter on the stone-coated worms*, which the fishermen call *haddock-meat*.

The grand shoal of haddocks comes periodically on the Yorkshire coasts. It is remarkable that they appeared in 1766 on the 10th of December, and exactly on the same day in 1767: these shoals extended from the shore near three miles in breadth, and in length from Flamborough head to Tinnmouth-castle, and perhaps much farther northwards. An idea may be given of their numbers by the following fact: Three fishermen, within the distance of a mile from Scarborough harbour, frequently loaded their coble or boat with them twice a-day, taking each time about a ton of fish: when they put down their lines beyond the distance of three miles from the shore, they caught nothing but dog-fish, which shows how exactly these fish keep their limits. The best haddocks were sold from eightpence to a shilling *per score*; and the poor had the smaller sort at a penny and sometimes a halfpenny *per score*.

The large haddocks quit the coast as soon as they go out of season, and leave behind great plenty of small ones. It is said that the large ones visit the coasts of Hamburg and Jutland in the summer. It is no less remarkable than providential, that all kinds of fish (except mackerel) which frequent the Yorkshire coast, approach the shore, and as it were offer themselves to us, generally remaining there as long as they are in high season, and retire from us when they become unfit for use. It is the commonest species in the London markets. They do not grow to a great bulk, one of 14 pounds being of an uncommon size, but those are extremely coarse; the best for the table weighing from two to three pounds.

3. The *barbatus*, or *POUT*, never grows to a large size, seldom exceeding a foot in length. It is distinguished from all others by its great depth; one of the size above mentioned being near four inches deep in the broadest part. The back is very much arched, and carinated; the colour of the fins and tail are black: at the bottom of the pectoral fins is a black spot. The lateral line is white, broad, and crooked. The tail is even at the end, and of a dusky colour. The colour of the body is white; but more obscure on the back than the belly, and tinged with yellow.—It is called at Scarborough a *kleg*, and is a very delicate fish.

4. The *Minutus*, or *POOR*, is the smallest species yet discovered, being little more than six inches long. On the chin is a small beard: the eyes are covered with a loose membrane: on the gill-covers and the jaws there are on each side nine punctures. The colour on the back is a light brown; on the belly a dirty white. It is taken near Marseilles, and sometimes in such quantities as to become a nuisance; for no other kinds of fish are taken during their season. It is esteemed good, but incapable of being salted or dried. Belon says, that when it is dried in the sun, it grows as hard as horn. We owe the discovery of this kind in our seas to the Reverend Mr Jago.

5. The *carbonarius*, or *COAL-FISH*, is of a more elegant form than the cod-fish: they generally grow to the length of two feet and an half, and weigh about 28 or 30 pounds at most. The head is small; the under jaw a little longer than the upper: The tail is broad and forked. They vary in colour: Some have their back, nose, dorsal fins, and tail, of a deep black; the gill-covers, silver and black; the ventral and anal fins, and the belly, white: Others are dusky, others brown; but, in all, the lateral line is straight and white, and the lower part of the ventral and anal fins white. This fish takes its name from the black colour that it sometimes assumes. Belon calls it the *colfisch*, imagining that it was so named by the English, from its producing the Ichthyocolla; but Gesner gives the true etymology. These fish are common on most of our rocky and deep coasts, but particularly those of the north of Great Britain. They swarm about the Orkneys, where the fry are the great support of the poor. The young begin to appear on the Yorkshire coast the beginning of July in vast shoals, and are at that time about an inch and an half long. In August they are from three to five inches in length, and are taken in great numbers with the angling rod: they are then esteemed a very delicate fish; but grow so coarse when they are a year old, that few people will eat them. Fish of that age are from 8 to 15 inches long, and begin to have a little blackness near the gills and on the back, and the blackness increases as they grow older.

The fry is known by different names in different places: they are called at Scarborough *parrs*; and when a year old, *billets*. About 20 years ago such a glut of parrs visited that part, that for several weeks it was impossible to dip a pail into the sea without taking some.

Though this fish is so little esteemed when fresh, yet it is salted and dried for sale.

6. The *pollachius*, or *POLLACK*, has the under jaw longer than the upper; the head and body rises pretty high, as far as the first dorsal fin. The side line is incurvated, rising towards the middle of the back, then sinking and running straight to the tail; it is broad, and of a brown colour. The colour of the back is dusky, sometimes inclining to green: the sides beneath the lateral line are marked with lines of yellow; and the belly is white.—This fish is common on many of our rocky coasts: during summer they are seen in great shoals frolicking on the surface of the water, and flinging themselves into a thousand forms. They are at that time so wanton as to bite at any thing that appears on the top of the waves, and are often taken with

Gadus.

Gallus.

with a goose-feather fixed to the hook. They are very strong, being observed to keep their station at the feet of the rocks in the most turbulent and rapid sea. They are a good eating fish. They do not grow to a very large size; at least the biggest seldom exceed six or seven pounds: but some have been taken in the sea near Scarborough, which they frequent during winter, that weighed near 28 pounds. They are there called *leets*.

7. The *merlangus*, or WHITING, is a fish of an elegant make: the upper jaw is the longest; the eyes are large, the nose is sharp; the teeth of the upper jaw are long, and appear above the lower when closed. The colour of the head and back is a pale brown; the lateral line white, and crooked; the belly and sides are silvery, the last streaked lengthwise with yellow.

These fish appear in vast shoals in our seas in the spring, keeping at the distance of about half a mile to that of three from the shore. They are caught in vast numbers by the line, and afford excellent diversion. They are the most delicate, as well as the most wholesome, of any of the genus: but they do not grow to a large size, the biggest not exceeding 20 inches; and even that is very uncommon, the usual length being 10 or 12; though, it is said, that whittings from 4 to 8 pounds in weight have been taken in the deep water at the edge of the Dogger-Bank.

8. The *merlucius*, or HAKE, is found in vast abundance on many of our coasts, and of those of Ireland. There was formerly a vast stationary fishery of hake on the Nymph Bank off the coast of Waterford, immense quantities appearing there twice a-year; the first shoal coming in June, during the mackerel-season; the other in September, at the beginning of the herring-season, probably in pursuit of those fish: it was no unusual thing for six men with hooks and lines to take a thousand hake in one night, besides a considerable quantity of other fish. These were salted and sent to Spain, particularly to Bilboa. We are at this time uninformed of the state of this fishery; but find that Mr Smith, who wrote the history of the county of Waterford, complains even in his time (1746) of its decline. Many of the gregarious fish are subject to change their situations, and desert their haunts for numbers of years, and then return again. Mr Smith instances the loss of the haddock on the Waterford shores, where they used to swarm; and we can bring the capriciousness of the herrings, which so frequently quit their stations, as another example.—Sometimes the irregular migration of fish is owing to their being followed and harassed by an unusual number of fish of prey, such as the shark kind; sometimes to deficiency of the smaller fish, which served them as food; and lastly, in many places to the custom of trawling, which not only demolishes a quantity of their spawn, which is deposited in the sand, but also destroys or drives into deeper waters numberless worms and insects, the repast of many fish.—The hake is in England esteemed a very coarse fish, and is seldom admitted to table either fresh or salted. When cured, it is known by the name of *Poor John*. These fish are from a foot and an half to near twice that length: they are of a slender make, of a pale ash-colour on their backs, and of a dirty white on their bellies.

10. The *molva*, or LING, is usually from three to

N^o 133.

four feet long, but have been heard of seven feet long. The body is very slender; the head flat: the upper jaw is the longest; the teeth in that jaw are small and very numerous; in the lower, few, slender, and sharp: on the chin is a small beard. They vary in colour, some being of an olive hue on the sides and back, others cinereous; the belly white. The ventral fins are white: the dorsal and anal edged with white. The tail is marked near the end with a transverse black bar, and tipped with white. The ling takes its English name from its length, being corrupted from the word *long*. It abounds about the Scilly Isles, on the coast of Scarborough, and those of Scotland and Ireland, and forms a considerable article of commerce. This branch of trade was considerable so long ago as the reign of Edward III. an act for regulating the price of lob, *ling*, and cod, being made in his 31st year. In the Yorkshire seas they are in perfection from the beginning of February to the beginning of May, and some till the end of that month. In June they spawn, depositing their eggs in the soft oozy ground of the mouth of the Tees: at that time the males separate from the females, and resort to some rocky ground near Flamborough-head, where the fishermen take great numbers without ever finding any of the female or roe'd fish among them. While a ling is in season its liver is very white, and abounds with a fine-flavoured oil; but as soon as the fish goes out of season, the liver becomes red as that of a bullock, and affords no oil. The same happens to the cod and other fish in a certain degree, but not so remarkably as in the ling. When the fish is in perfection, a very large quantity of oil may be melted out of the liver by a slow fire; but if a violent sudden heat be used for that purpose, they yield very little. The oil, which nature hoards up in the cellular membranes of the fishes, returns into their blood, and supports them in the engendering season, when they pursue the business of generation with so much eagerness as to neglect their food. Vast quantities of ling are salted for exportation as well as for home-consumption. When it is cut or split for curing, it must measure 26 inches or upwards from the shoulder to the tail: if less than that, it is not reckoned a sizeable fish, and consequently not intitled to the bounty on exportation; such are called *drizzles*, and are in season all summer.

11. The *lota*, or STURBOT, in its body has some resemblance to that of an eel, only shorter and thicker; and its motions also resemble those of that fish: they are besides very smooth, slippery, and slimy. The head is very ugly, being flat, and shaped like that of a toad: the teeth are very small, but numerous. On the end of the nose are two small beards; on the chin another. The colour varies: some are dusky, others are of a dirty green, spotted with black, and oftentimes with yellow; and the belly in some is white; but the real colours are frequently concealed by the slime. This fish abounds in the lake of Geneva, where it is called *lota*; and it is also met with in the Lago Maggiore and Lugano. In Britain it is found in the Trent; but in greater plenty in the river Witham, and in the great east fen in Lincolnshire. It is a very delicate fish for the table, though of a disgusting appearance when alive. It is very voracious, and preys on the fry and lesser fish. It does not often take a bait, but is generally

Gallus.

rally caught in weels. The largest taken in our waters weigh between two and three pounds, but abroad they are sometimes found of double that weight.

12. The *mustela*, or FIVE-BEARDED COD, very much resembles the former. The beards on the upper jaw are four, viz. two at the very end of the nose, and two a little above them: on the end of the lower jaw is a single one. The fish are of a deep olive brown, their belly whitish. They grow to the same size as the former.—The Cornish fishermen are said to whistle, and make use of the words *bod, bod, vean*, when they are desirous of taking this fish, as if by that they facilitated the capture. In the same manner the Sicilian fishermen repeat their *ma-massu di pajanu*, &c. when they are in pursuit of the sword-fish.

13. The *Torsk*, or, as it is called in the Shetlands, *tusk* and *brismack*, is a northern fish; and as yet undiscovered lower than about the Orkneys, and even there it is rather scarce. In the seas about Shetland, it swarms, and forms (barrelled or dried) a considerable article of commerce. The length is about 20 inches, the greatest depth four and a half. The head is small; the upper jaw a little longer than the lower; both jaws furnished with multitudes of small teeth: on the chin is a small single beard: from the head to the dorsal fin is a deep furrow. The colour of the head is dusky: the back and sides yellow; belly white; edges of the dorsal, anal, and caudal fins, white; the other parts dusky; the pectoral fins brown.

GAELIC LANGUAGE. See HIGHLANDS.

GÆTULIA, (anc. geog.), a country of Africa, lying to the south of Mauritania, called *Gætulia Propria*, and *Vetus Gætuli*, the people, were distinguished by different epithets; as *Nigri*, *Autololes*, *Daræ*, and *Baniura*, (Pliny). The *Gætuli* were among the first inhabitants of Africa; a rough, unpolished people, living on venison and the spontaneous productions of the earth; a roving wandering people, who took up with the first place in which night surprized them, (Sallust.);

GAFF, a sort of boom or pole, frequently used in small ships, to extend the upper edge of the mizen; and always employed for the same purpose on those sails whose foremost edges are joined to the mast by hoops or lacing, and which are usually extended by a boom below. Such are the main-sails of all sloops, brigs, and schooners.

GAFFAREL (James), a French divine, and very learned writer, born about 1601. He acquired great skill in the oriental and several other languages; and was particularly versant in the cabalistic and occult sciences, which he learned, exposed, and refuted. Cardinal Richelieu made choice of him for his library-keeper, and sent him into Italy to collect the best manuscripts and books. He published a book, intitled *Curiositez Innouies*, i. e. Unheard-of Curiosities. It is said the cardinal designed to employ him in his grand project for the re-union of religions. He died in 1681, aged 80. He had been labouring for many years, and had almost finished, a history of the subterranean world; containing an account of the caves, grottoes, vaults, catacombs, and mines, he had met with in 30 years travels.

GAGATES, or JET. See JET.

GAGE, in our ancient customs, signifies a pledge

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or pawn, given by way of security. The word is only properly used in speaking of moveables; for immoveables, *hypotheca* is used.

If the gage perish, the person who received it is not to answer for it, but only for extreme negligence, &c.

GAGE is also used for a challenge to combat: See CARTEL. In which sense, it was a pledge, which the accuser or challenger cast on the ground, and the other took up as accepting the challenge: it was usually a glove, gauntlet, chaperoon, or the like. See COMBAT, and DUEL.

GAGE is only now retained as a substantive. As a verb, the G is changed into W, and of *gage* is formed *wage*: as, to wage law, to wage deliverance, *q. d.* to give security a thing shall be delivered. See WAGE.

If a person who has distrained be sued for not having delivered what he had taken by distress, he should wage, or gage, or gager, deliverance; that is, put in surety that he will deliver them.

MORT-GAGE, is that which is left in the hands of the proprietor, so that he reaps the fruits thereof.

In opposition to *vif-gage*, where the fruits or revenues are reaped by the creditor, and reckoned on the foot of the debt, which diminishes in proportion thereto. The second acquits or discharges itself; the first does not.

GAGE, in the sea-language. When one ship is to windward of another, she is said to have the weather-gage of her. They likewise call the number of feet that a vessel sinks in the water, the ship's *gage*; this they find by driving a nail into a pike near the end, and putting it down beside the rudder till the nail catch hold under it; then as many feet as the pike is under water is the ship's *gage*.

GAGE, among letter-founders, a piece of box, or other hard wood, variously notched; the use of which is to adjust the dimensions, slopes, &c. of the different sorts of letters. See FOUNDRY.

GAGE, in joinery, is an instrument made to strike a line truly parallel to the straight side of any board or piece of stuff. Its chief use is for gaging of tenons true, to fit into mortises; and for gaging stuff of an equal thickness. It is made of an oval piece of wood, fitted upon a square stick, to slide up and down stiffly thereon, and with a tooth at the end of a staff, to score, to strike a line upon the stuff at any distance, according to the distance of the oval from it.

Sliding GAGE, a tool used by mathematical instrument-makers for measuring and setting off distances.

Sea-GAGE, an instrument invented by Dr Hales and Dr Desaguliers for finding the depth of the sea; the description whereof is this. AB (Plate CCV. fig. 1. n° 1.) is the gage-bottle, in which is cemented the gage-tube *Ff* in the brass cape at G. The upper end of tube F is hermetically sealed, and the open lower end *f* is immersed in mercury, marked C, on which swims a small thickness or surface of treacle. On the top of the bottle is screwed a tube of brass HG, pierced with several holes to admit the water into the bottle AB. The body K is a weight hanging by its shank L, in a socket N, with a notch on one side at *m*, in which is fixed the catch *V* of the spring S, and, passing

Gage.

Gage. passing through the hole L, in the shank of the weight K, prevents its falling out when once hung on. On the top, in the upper part of the brass tube at H, is fixed a large empty ball, or full-blown bladder I, which must not be so large, but that the weight K may be able to sink the whole under water.

The instrument thus constructed is used in the following manner. The weight K being hung on, the gage is let fall into deep water, and sinks to the bottom: the socket N is somewhat longer than the shank L; and therefore, after the weight K comes to the bottom, the gage will continue to descend till the lower part of the socket strikes against the weight: this gives liberty to the catch to fly out of the hole L, and let go the weight K: when this is done, the ball or bladder I instantly buoys up the gage to the top of the water. While the gage is under water, the water having free access to the treacle and mercury in the bottle, will by its pressure force it up into the tube Ff, and the height to which it has been forced by the greatest pressure, viz. that at the bottom, will be shown by the mark in the tube which the treacle leaves behind it, and which is the only use of the treacle. This shows into what space the whole air in the tube Ff is compressed; and consequently the height or depth of the water which by its weight produced that compression, which is the thing required.

If the gage-tube Ff be of glass, a scale might be drawn on it with the point of a diamond, showing, by inspection, what height the water stands above the bottom. But the length of 10 inches is not sufficient for fathoming depths at sea, since that, when all the air in such a length of tube is compressed into half an inch, the depth of water is no more than 634 feet, which is not half a quarter of a mile.

If, to remedy this, we make use of a tube 50 inches long, which for strength may be a musket-barrel, and suppose the air compressed into an hundredth part of half an inch; then by saying, as 1 : 99 :: 400 : 39600 inches, or 3300 feet; even this is but little more than half a mile, or 2640 feet. But since it is reasonable to suppose the cavities of the sea bear some proportion to the mountainous parts of the land, some of which are more than three miles above the earth's surface; therefore, to explore such great depths, the doctor contrived a new form for his sea-gage, or rather for the gage-tube in it, as follows. BCDF (*ibid.* n° 2.) is a hollow metalline globe communicating on the top with a long tube AB, whose capacity is a ninth part of that globe. On the lower part at D, it has also a short tube DE, to stand in the mercury and treacle. The air contained in the compound gage-tube is compressed by the water as before; but the degree of compression, or height to which the treacle has been forced, cannot there be seen through the tube; therefore, to answer that end, a slender rod of metal or wood, with a knob on the top of the tube AB, will receive the mark of the treacle, and show it when taken out.

If the tube AB be 50 inches long, and of such a bore that every inch in length should be a cubic inch of air, and the contents of the globe and tube together 500 cubic inches; then, when the air is compressed within an hundredth part of the whole, it is

evident the treacle will not approach nearer than five inches of the top of the tube, which will agree to the depth of 3300 feet of water as above. Twice this depth will compress the air into half that space nearly, viz. $2\frac{1}{2}$ inches, which correspond to 6600, which is a mile and a quarter. Again, half that space, or $1\frac{1}{4}$ inch, will show double the former depth, viz. 13200 feet, or $2\frac{1}{2}$ miles; which is probably very nearly the greatest depth of the sea.

Bucket Sea-GAGE; an instrument contrived by Dr Fig. 2.

Hales, to find the different degrees of coolness and saltness of the sea, at different depths: it consists of a common household pail or bucket, with two heads. These heads have each a round hole in the middle, about four inches in diameter, covered with square valves opening upward; and that they may both open and shut together, there is a small iron rod fixed to the upper part of the lower valve, and the other end to the lower side of the upper valve. So that as the bucket descends with its sinking weight into the sea, both the valves may open by the force of the water, which by that means has a free passage through the bucket. But when the bucket is drawn up, then both the valves shut by the force of the water at the upper part of the bucket; so that the bucket is drawn up full of the lowest sea water to which it has descended. When the bucket is drawn up, the mercurial thermometer fixed in it is examined; but great care must be taken to observe the degree at which the mercury stands, before the lower part of the thermometer is taken out of the water in the bucket, lest it be affected by the different temperature of the air. In order to keep the bucket in a right position, there are four cords fixed to it, reaching about three feet below it; to which the sinking weight is fixed. The result of several trials with this gage was, that when it was let down to different depths, from 360 feet to 5346 feet, in lat. 25. 13. N. and long. 25. 12. W. it was discovered by the thermometer, that the cold increased gradually in proportion to the depths, till it descended to 3900 feet, viz. near $\frac{2}{3}$ ths of a mile, whence the mercury in the thermometer came up at 53°; and though it was afterwards sunk to 5346 feet, i. e. a mile and 66 feet, it came up no lower: the warmth of the water upon the surface, and that of the air, was all that time 84°. When the water in the bucket was become of the same temperature with that on the surface of the sea, equal quantities of both were weighed and tried by the hydrometer; that from below was found to be the heaviest, and consequently the saltest.

Dr Hales was probably led to the construction of this sea-gage from an instrument invented by Dr Hook, and designed for the same purpose. This consists of a square wooden bucket C, whose bottoms are so contrived, that as the weight A sinks the iron B, to which the bucket C is fastened by two handles D, D, on the end of which are the moveable bottoms or valves E E, and thereby draws down the bucket, the resistance of the water keeps up the bucket in the posture C, whereby the water, whilst the bucket is descending, hath a free passage through it; whereas, as soon as the bucket is pulled upwards by the line F, the resistance of the water to that motion beats the bucket downwards, and keeps it in the posture G, whereby the included

Gage.

age. cluded water is kept from getting out, and the ambient water kept from getting in. Phil. Trans. No 9. p. 149. and No 24. p. 447. or abr. vol. ii. p. 260.

Aqueo-mercurial GAGE, is the name of an apparatus contrived by Dr Hales, and applied in various forms to the branches of trees, in order to determine the force with which they imbibe moisture. Let *er*, Fig. 3. be a cylindric glass, e. gr. of an inch diameter within, and eight inches long. Into this glass is introduced the branch of a young thriving apple-tree *b*, about three feet long, with lateral branches; the diameter of the transverse cut *i* being $\frac{1}{4}$ of an inch. Having fitted the joint *r* to the tube at *r*, by folding a piece of sheep's skin round the stem, it is cemented with a mixture of bees-wax and turpentine melted together, in such a proportion as to make a very stiff clammy paste when cold, and over the cement folds of wet bladders are bound firmly with pack-thread. To the lower end *e* of the large tube, a smaller tube *ez* is cemented, being about $\frac{1}{4}$ of an inch diameter, and 18 inches long, and in substance full $\frac{1}{8}$ of an inch thick. These tubes are cemented together at *e* with common hard brick-duft or powdered chalk cement, and the joint is farther secured with the cement of bees-wax and turpentine, over which a wet bladder is bound. The apparatus being thus prepared, the branch is turned downwards, and the glass tube upwards, and then both tubes are filled with water; with the finger applied to the open end of the small tube, it is inverted and immersed in the glass cistern *x*, full of mercury and water. In this situation the lower end of the branch was immersed six inches in water, viz. from *r* to *i*; the water was imbibed by the branch at its transverse cut *i*; and during its ascent into the sap-vessels of the branch, the mercury rose in the tube *ez* from the cistern *x*, so that in half an hour it was risen $5\frac{1}{4}$ inches high, as far as *z*. The height of the mercury indicated, in some measure, the force with which the sap was imbibed, though not the whole force; because, while the water was imbibed by the branch, its transverse cut was covered with innumerable little hemispheres of air, and many air-bubbles issued out of the sap-vessels, which partly filled the tube *er*, as the water was drawn out of it: and therefore, the height of the mercury could only be proportionable to the excess of the quantity of water drawn off above the quantity of the air which issued out of the wood. If the quantity of air issuing from the wood had been equal to the quantity of water imbibed, it is plain that the mercury could not rise at all, because there would be no room for it in the tube: but if nine parts in twelve of the water be imbibed by the branch, and only three such parts of air issue into the tube in the same time, the mercury must rise near six inches, and so proportionably in other cases. Dr Hales observed, that the mercury rose highest, in most cases, when the sun was clear and warm, and that it subsided three or four inches towards evening, but rose again the next day as it grew warm, though seldom so high as it first. Dr Hales adapted the size and shape of the glass apparatus to a great variety of branches of several sizes and of different kinds of trees, and repeated the experiment above described, *mutatis mutandis*, in a variety of instances. See his Vegetable Statics, vol. i. chap. ii. p. 84, &c.

Tide-GAGE, is the name of an instrument used for determining the height of the tides by Mr Bayly, in the course of a voyage towards the south-pole, &c. in the Resolution and Adventure, in 1772, 1773, 1774, and 1775. This instrument consists of a glass tube, whose internal diameter was seven-tenths of an inch, lashed fast to a ten feet fir rod, divided into feet, inches, and quarters: this rod was fastened to a strong post fixed upright and firm in the water. At the lower end of the tube was an exceeding small aperture, through which the water was admitted. In consequence of this construction, the surface of the water in the tube was so little affected by the agitation of the sea, that its height was not altered one-tenth of an inch, when the swell of the sea was two feet; and Mr Bayly was certain, that with this instrument he could discern a difference of one-tenth of an inch in the height of the tide.

Wind-GAGE, an instrument for measuring the force of the wind upon any given surface. It was invented by Dr Linn, who gives the following description of it, Phil. Trans. Vol. LXV.

This instrument consists of two glass tubes AB, CD, of five or six inches in length. Their bores, which are so much the better for being equal, are about four-tenths of an inch in diameter. They are connected together like a siphon, by a small bent glass-tube *ab*, Fig. 4. the bore of which is about one-tenth of an inch in diameter. On the upper end of the leg AB there is a tube of latten brass, which is kneed, or bent perpendicularly outwards, and has its mouth open towards F. On the other leg CD, is a cover with a round hole G in the upper part of it, two-tenths of an inch in diameter. This cover and the kneed tube are connected together by a slip of brass *ed*, which not only gives strength to the whole instrument, but also serves to hold the scale HI. The kneed tube and cover, are fixed on with hard cement or sealing wax. To the same tube is soldered a piece of brass *e*, with a round hole in it to receive the steel spindle KL; and at *f* there is just such another piece of brass soldered to the brass-hoop *gb*, which surrounds both legs of the instrument. There is a small shoulder on the spindle at *f*, upon which the instrument rests, and a small nut at *i*, to prevent it from being blown off the spindle by the wind. The whole instrument is easily turned round upon the spindle by the wind, so as always to present the mouth of the kneed tube towards it. The end of the spindle has a screw on it; by which it may be screwed into the top of a post or a stand made on purpose. It has also a hole at L, to admit a small lever for screwing it into wood with more readiness and facility. A thin plate of brass *k* is soldered to the kneed tube, about half an inch above the round hole G, so as to prevent rain from falling into it. There is likewise a crooked tube A B (fig. 5.) to be put occasionally upon the mouth of the kneed tube F, in order to prevent rain from being blown into the mouth of the wind-gage when it is left out all night, or exposed in the time of rain.

The force or momentum of the wind may be ascertained by the assistance of this instrument, by filling the tubes half full of water, and pushing the scale a little up or down, till the o of the scale, when the instrument is held up perpendicularly, be on a line with

the surface of the water in both legs of the wind-gage. The instrument being thus adjusted, hold it up perpendicularly, and turning the mouth of the kneed tube towards the wind, observe how much the water is depressed by it in the one leg, and raised in the other. The sum of the two is the height of a column of water, which the wind is capable of sustaining at that time; and every body that is opposed to that wind will be pressed upon by a force equal to the weight of a column of water, having its base equal to the altitude of the column of water sustained by the wind in the wind-gage. Hence the force of the wind upon any body where the surface opposed to it is known, may be easily found; and a ready comparison may be made betwixt the strength of one gale of wind and that of another.

The force of the wind may be likewise measured with this instrument, by filling it until the water runs out at the hole G. For if we then hold it up to the wind as before, a quantity of water will be blown out; and if both legs of the instrument are of the same bore, the height of the column sustained will be equal to double the column of water in either leg, or the sum of what is wanting in both legs. But if the legs are of unequal bores, neither of these will give the true height of the column of water which the wind sustained. But the true height may be obtained by the following formulæ.

Suppose that after a gale of wind which had blown the water from A to B (fig. 6.), forcing it at the same time through the other tube out at E, the surface of the water should be found standing at some level D G, and it were required to know what was the height of the column E F or A B, which the wind sustained. In order to obtain this, it is only necessary to find the height of the columns D B or G F, which are constantly equal to one another; for either of these added to one of the equal columns A D, E G, will give the true height of the column of water which the wind sustained.

1. Let the diameters A C, E H, of the tubes, be respectively represented by cd ; and let $a=AD$, or EG , and $x=DB$, or GF : Then it is evident, that the column D B is to the column E G, as c^2x to d^2a . But these columns are equal. Therefore $c^2x=d^2a$; and consequently $x=\frac{d^2a}{c^2}$.

2. But if at any instant of time whilst the wind was blowing, it was observed, that, when the water stood at E, the top of the tube out of which it is forced, it was depressed in the other to some given level B F, the altitude at which it would have stood in each had it immediately subsided, may be found in the following manner.—Let $b=AB$ or EF .—Then it is evident that the column D B is equal to the difference of columns E F, G F. But the difference of these columns

is as d^2b-d^2x ; and consequently $x=\frac{d^2b}{c^2+d^2}$.

For the cases when the wind blows in at the narrow leg of the instrument: Let $AB=EF=b$, EG , or $AD=a$, $GF=DB=x$, and the diameters E H, G A, respectively $=d, c$, as before. Then it is evident, that the column A D is to the column G F as ac^2 to d^2x . But these columns are equal; therefore $d^2x=ac^2$;

and consequently $x=\frac{ac^2}{d^2}$. It is also evident, that the column A D is equal to the difference of the columns A B, D B; but the difference of these columns is as bc^2-c^2x . Therefore $d^2x=bc^2-c^2x$. Whence we get $x=\frac{bc^2}{d^2+c^2}$.

The use of the small tube of communication $a b$ (fig. 4.), is to check the undulation of the water, so that the height of it may be read off from the scale with ease and certainty. But it is particularly designed to prevent the water from being thrown up to a much greater or less altitude, than the true height of the column which the wind is able at that time to sustain, from its receiving a sudden impulse whilst it is vibrating either in its ascent or descent. As in some cases the water in this instrument might be liable to freeze, and thus break the tubes, Dr Lind recommends a saturated solution of sea-salt to be used instead of it, which does not freeze till Fahrenheit's thermometer falls to 0.

GAHNIA, in botany: A genus of the monogynia order, belonging to the hexandria class of plants. The calyx is an involucre with two or five flowers; the corolla is two-valved; the stamina fix capillary and very short filaments; the antheræ linear, sharp-pointed at the apex, and as long as the corolla; there is no pericarpium: the seed is single and oblong.

GALETA, an ancient, handsome, and strong town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, with a fort, citadel, harbour, and bishop's see. It was taken by the Austrians in 1707, and by the Spaniards in 1734. It is seated at the foot of a mountain near the sea, in E. Long. 13. 37. N. Lat. 41. 30.

GAIN, the profit or lucre a person reaps from his trade, employment, or industry. Some derive the word from the German *gewin*: whereof the Italians had made *guadagno*; the French and English *gain*.

There are legal and reputable gains, as well as fordid and infamous ones. What is gained beyond a certain sum, by gaming, is all liable to be restored again, if the loser will take the benefit of the law.

GAIN, in architecture, is the workmens term for the bevelling shoulder of a joist or other timber. It is used, also, for the lapping of the end of the joist, &c. upon a trimmer or girder; and then the thickness of the shoulder is cut into the trimmer, also bevelling upwards, that it may just receive the gain; and so the joist and trimmer lie even and level with the surface. This way of working is used in floors and hearths.

To *GAIN the wind*, in sea-language, is to arrive on the weather-side or to windward of some other vessel in sight, when both are plying to windward, or sailing as near the wind as possible.

GAINAGE, **GAINAGIUM**, in our ancient writers, signifies the draught-oxen, horses, wain, plough, and furniture, for carrying on the work of tillage by the baser sort of folkemen and villains.

Gainage is the same with what is otherwise called *wainage*. Bracton, lib. i. cap. 9. speaking of lords and servants, says, *Ut si eos destruunt, quod saluum non possit eis esse wainagium suum*. And again, lib. iii. tract. 2.

cap.

Gainage
||
Galanthus.

cap. i. *Villanus non amercabitur, nisi salvo wainagio suo.* For anciently, as it appears both by Magna Charta and other books, the villain, when amerced, had his gainage or wainage free; to the end his plough might not stand still: and the law, for the same reason, does still allow a like privilege to the husbandman; that is, his draught-horses are not in many cases distrainable.

GAINAGE is also used for the land itself, or the profit raised by cultivating it.

GAINSBOROUGH, a town of Lincolnshire in England, 150 miles from London, seated on the river Trent near the sea. It is a large well built town, with a pretty good trade, and has the title of an earldom. W. Long. O. 40. N. Lat. 53. 26. The north marsh in its neighbourhood is noted for horse-races. The Danes who invaded the kingdom brought their ships up to this place. It was here that Sweno the Dane was murdered by one of the English, who was never discovered.

GALACTITES, in the history of fossils, a substance much resembling the morochthus or French chalk, in many respects; but different from it in colour. The ancients found it in the Nile and in some rivers in Greece, and used it in medicine as an astrigent, and for defluxions and ulcers of the eyes. At present it is common in Germany, Italy, and some parts of France, and is wholly overlooked, being esteemed a worse kind of morochthus. See MOROCHTHUS.

GALACTOPHAGI, and GALACTOPOTÆ, in antiquity, persons who lived wholly on milk, without corn or the use of any other food. The words are compounded of γάλα, γαλακτός, milk; φαγω, to eat; and ποτιν of πινω, I drink.

Certain nations in Scythia Asiatica, as the Getæ, Nomades, &c. are famous, in ancient history, in quality of galactophagi, or milk-eaters. Homer makes their elege, Iliad, lib. iii.

Ptolemy, in his geography, places the Galactophagi between the Rhipæan mountains on one side, and the Hircanian sea on the other.

GALANGALS, in the materia medica. See KEMPPERIA.

GALANTHUS, the SNOW-DROP, in botany: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the ninth order, *Spathaceæ*. There are three concave petals; and the nectarium consists of three small emarginated petals; the stigma is simple. There is but one species, viz. the *nivalis*; which is a bulbous-rooted flowery perennial, rising but a few inches in height, and adorned at top with small tripetalous flowers of a white colour. There are three varieties, viz. the common single-flowered snow-drop, the semi-double snow-drop, and the double snow-drop. They are beautiful little plants; and are much valued on account of their early appearance, often adorning the gardens in January or February, when scarce any other flower is to be seen. They frequently burst forth when the ground is covered with snow, and continue very often till the beginning of March, making a very ornamental appearance, especially when disposed in clusters towards the fronts of the borders, &c. The single kind comes first into bloom, then the semi-double, and after

that the double. They will succeed any where, and multiply exceedingly by off-sets from the roots.

GALATA, a great suburb belonging to Constantinople, opposite to the seraglio, on the other side of the harbour. It is here the Greeks, Armenians, Franks, Christians, and Jews inhabit, and are allowed the exercise of their respective worship.

GALATÆA and GALATHÆA, (fab. hist.), a sea-nymph, daughter of Nereus and Doris. She was passionately loved by the cyclops Polyphemus, whom she treated with coldness and disdain; while Acis, a shepherd of Sicily enjoyed her unbounded affection. The happiness of these two lovers was disturbed by the jealousy of the Cyclops, who crushed his rival to pieces with a piece of a broken rock while he reposed on the bosom of Galatæa. The nymph was inconsolable for the loss of Acis; and as she could not restore him to life, she changed him into a fountain.

GALATIA, the ancient name of a province of Asia Minor, now called *Amasia*. It was bounded on the east by Cappadocia, on the west by Bithynia, on the south by Pamphylia, and on the north by the Euxine sea. It was the north part of Phrygia Magna; but upon being occupied by the Gauls was called *Galatia*; and because situated amidst Greek colonies, and itself mixed with Greeks, *Gallogracia*. Strabo calls it *Galatia*, and *Gallogracia*: hence a two-fold name of the people; *Galatæ* and *Gallogracæ*. The Greeks called it *Gallia Parva*; to distinguish it from the *Transalpina*, both which they called *Galatia*. It was reduced under the subjection of the Romans in the time of Augustus, and is now in the hands of the Turks. Here St Paul founded a church, to which he directed that epistle which is still known by the name of the *Epistle to the Galatians*, and was written to reclaim them from the observation of Jewish ordinances, into which they had been seduced by some false teachers.

GALAX, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is salver-shaped; the calyx decaphyllous; the capsule unilocular, bivalved, and elastic.

GALAXY, in astronomy, that long, white, luminous track, which seems to encompass the heavens like a swath, scarf, or girdle: and which is easily perceivable in a clear night, especially when the moon does not appear. The Greeks call it Γαλαξίας, *Galaxy*, of γάλα, γαλακτός, *Milk*; on account of its colour and appearance: the Latins, for the same reasons, call it *via lactea*; and we, the *milky-way*. It passes between Sagittarius and Gemini, and divides the sphere into two parts; it is unequally broad; and in some parts is single, in others double.

The ancient poets, and even philosophers, speak of the Galaxy, as the road or way by which the heroes went to heaven.

Aristotle makes it a kind of meteor, formed of a crowd of vapours, drawn into that part by certain large stars disposed in the region of the heavens answering hereto.

Others, finding that the Galaxy was seen all over the globe, that it always corresponded to the same fixed stars, and that it transcended the height of the highest planets, set aside Aristotle's opinion, and placed the

Galatæa
||
Galaxy.

Galba
||
Gale.

the Galaxy in the firmament, or region of the fixed stars, and concluded it to be nothing but an assemblage of an infinite number of minute stars.

Since the invention of the telescope, this opinion has been abundantly confirmed. By directing a good telescope to any part of the milky-way; where, before, we only saw a confused whiteness, we now descry an innumerable multitude of little stars, so remote, that a naked eye confounds them. See ASTRONOMY, n^o 119.

GALBA (Servius Sulpicius), a Roman emperor, born the 24th of December, five years before the Christian era. He was gradually raised to the greatest offices of the state, and exercised his power in the provinces with the greatest equity and unremitted diligence. He dedicated the greatest part of his time to solitary pursuits, chiefly to avoid the suspicions of Nero. His disapprobation of the emperor's oppressive command in the provinces was the cause of new disturbances. Nero ordered him to be put to death; but he escaped from the hands of the executioner, and was publicly saluted emperor. When he was seated on the throne, he suffered himself to be governed by favourites, who exposed the goods of the citizens to sale to gratify their avarice. Exemptions were sold at a high price; and the crime of murder was blotted out, and impunity purchased with a large sum of money. Such irregularities in the emperor's ministers greatly displeased the people; and when Galba refused to pay the soldiers the money which he had promised them when he was raised to the throne, they assassinated him in the 73d year of his age, and the eighth month of his reign. The virtues which had shone so bright in Galba when a private man, totally disappeared when he ascended the throne; and he who showed himself the most impartial judge, forgot the duties of an emperor and of a father of his people.

GALBANUM, in pharmacy, a gum issuing from the stem of an umbelliferous plant growing in Persia and many parts of Africa. See BUBON.

The juice, as brought to us, is semipellucid, soft, tenacious; of a strong, and to some unpleasant, smell; and a bitterish warm taste: the better sort is in pale coloured masses, which, on being opened, appear composed of clear white tears. Geoffroy relates, that a dark greenish oil is to be obtained from this simple by distillation, which, upon repeated rectifications, becomes of an elegant sky blue colour. The purer sorts of galbanum are said by some to dissolve entirely in wine, vinegar, or water; but these liquors are only partial menstrua with regard to this drug; nor do spirit of wine or oils prove more effectual in this respect: the best dissolvent is a mixture of two parts spirit of wine and one of water. Galbanum agrees in virtue with gum ammoniacum; but is generally accounted less efficacious in asthmas, and more so in hysterical complaints. It is an ingredient in the gum pills, the gum plaster, and some other officinal compositions.

GALE, in the sea-language, a term of various import. When the wind blows not so hard but that a ship may carry her top-sails a-trip (that is, hoisted up to the highest), then they say it is a loom-gale. When it blows very strong, they say it is a stiff, strong, or fresh gale. When two ships are near one another at sea, and, there being but little wind blowing, one of

them finds more of it than the other, they say that the one ship gales away from the other.

GALE (Dr John), an eminent and learned minister among the Baptists, was born at London in 1680. He studied at Leyden, where he distinguished himself very early, and afterwards at Amsterdam, under Dr Limborch. He was chosen minister of the Baptist congregation at Barbican; where his preaching, being chiefly practical, was greatly resorted to by people of all persuasions. Four volumes of his sermons were published after his death, which happened in 1721. His *Reflections on Dr Wall's History of Infant baptism*, is the best defence of the Baptists ever published, and the reading of that performance induced the learned Mr William Whiston and Dr Foster to become Baptists.

GALE (Theophilus), an eminent nonconformist minister, born in 1628. He was invited to Winchester in 1657; and continued a stated preacher there until the re-establishment of the church by Charles II. when he rather chose to suffer the penalties of the act of conformity, than to submit to it contrary to his conscience. He was afterwards engaged by Philip lord Wharton as tutor to his sons, whom he attended to an academy at Caen in Normandy; and when this duty was fulfilled, he became pastor over a congregation of private conventiclers in Holborn. He died in 1678; and is principally known by an elaborate work, intitled, the *Court of the Gentiles*, calculated to show, that the Pagan philosophers derived their most sublime sentiments from the Scriptures.

GALE (Dr Thomas), a learned divine, born at Scruton in Yorkshire, in the year 1636, was educated at Cambridge, and at length became professor of the Greek language in that university. He was afterwards chosen head master of St Paul's school, London; and was employed by the city in writing those elegant inscriptions on the monument erected in memory of the conflagration in 1666. In 1676 he was collated to a prebend in the cathedral of St Paul's; and was likewise elected a fellow of the Royal Society, to which he presented a Roman urn with its ashes. About the year 1697, he gave to the new library of Trinity college, in Cambridge, a great number of Arabic manuscripts; and in 1697 was admitted dean of York. He died in that city in 1702; and was interred in the cathedral, where a monument, with a Latin inscription, was erected to his memory. He was a learned divine, a great historian, one of the best Greek scholars of his age, and maintained a correspondence with the most learned men abroad as well as at home. He published, 1. *Historia Poetica Antiqui Scriptores*, octavo. 2. *Opuscula Mythologica, Ethica, & Physica*, in Greek and Latin, octavo. 3. *Herodoti Historia*, folio. 4. *Historia Anglicana Scriptores quinque*, in folio. 5. *Historia Britannica, Saxonica, Anglo-Danica, Scriptores quindecim*, in folio. 6. *Rhetores Selecti, &c.*

GALEA, in antiquity, a light casque, head-piece, or morrion, coming down to the shoulders, and commonly of brass; though Camillus, according to Plutarch, ordered those of his army to be of iron, as being the stronger metal. The lower part of it was called *buccula*, and on the top was a crest. The Velites wore a light galea, made of the skin of some wild beast to make it more terrible.

GALEASSE, a large low-built vessel, using both sails

Gale
||
Galeasse.

Galega,
Galen.

sails and oars, and the biggest of all the vessels that make use of the latter. It may carry twenty guns, and has a stern capable of lodging a great number of marines. It has three masts, which are never to be lowered or taken down. It has also thirty-two benches of rowers; and to each bench six or seven slaves, who sit under cover. This vessel is at present used only by the Venetians.

GALEGA, in botany: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is composed of subulated nearly equal dents or segments; the legumen has oblique striz, and seeds lying between them.

GALEN (Claudius), in Latin *Galenus*, prince of the Greek physicians after Hippocrates, was born at Pergamus in the Lesser Asia, about the year 131. His father was possessed of a considerable fortune; was well versed in polite literature, philosophy, astronomy, and geometry; and was also well skilled in architecture. He himself instructed his son in the first rudiments of learning, and afterwards procured him the greatest masters of the age in philosophy and eloquence. Galen having finished his studies under their care, chose physic for his profession, and chiefly studied the works of Hippocrates. Having at length exhausted all the sources of literature that were to be found at home, he resolved to travel, in order to converse with the most able physicians in all parts, intending at the same time to take every opportunity of inspecting on the spot the plants and drugs of the countries through which he passed. With this view he went to Alexandria, and staid some years in that metropolis of Egypt: from thence he travelled through Cilicia; passed through Palestine; visited the isles of Crete and Cyprus; and made two voyages to Lemnos, in order to examine the Lemnian earth, which was then esteemed an admirable medicine. With the same view he went into the Lower Tyria, in order to obtain a thorough insight into the nature of the opobalsamum, or balm of Gilead; and having completed his design, returned home by the way of Alexandria.

Galen had been four years at Pergamus, where his practice was attended with extraordinary applause, when some seditious commotions induced him to go to Rome, where he resolved to settle: but the proofs he gave of his superior skill, added to the respect shown him by several persons of very high rank, created him so many enemies among his brethren of the faculty, that he was obliged to quit the city, after having resided there four or five years. But he had not long returned to Pergamos, when he was recalled by the emperors Aurelius and Verus. After their death, he retired to his native country; where he died, about the year 200. He wrote in Greek; and is said to have composed two hundred volumes, which were unhappily burnt in the temple of Peace. The best editions of those that remain, are, that printed at Basil in 1538, in five volumes, and that of Venice in 1625, in seven volumes. Galen was of a weak and delicate constitution, as he himself asserts: but he nevertheless, by his temperance and skill in physic, arrived to a great age; for it was his maxim, always to rise from table with some degree of appetite. He is justly considered as the greatest physician of antiquity, next to Hippo-

crates; and he performed such surprising cures, that he was accused of magic.

GALENA, a name given by mineralists to a species of poor lead-ore. It was, also the original name given by Andromachus to the theriaca, from its effect in bringing on a pleasing calm over the blood and spirits on taking it.

GALENIA, in botany: A genus of the digynia order, belonging to the octandria class of plants; and in the natural method ranking under the 13th order, *Succulentæ*. The calyx is trifid; there is no corolla; the capsule is roundish and dispermous.

GALENIC, or GALENICAL, in medicine, is that manner of considering and treating diseases, founded on the principles of Galen, or introduced by GALEN. This author, collecting and digesting what the physicians before him had done, and explaining every thing according to the strictest doctrine of the Peripatetics, set physic on a new footing: he introduced the doctrine of the four elements; the cardinal qualities and their degrees; and the four humours or temperaments.

GALENIC is more frequently used as contradistinguishing from *chemical*.

The distinction of *galenical* and *chemical* was occasioned by a division of the practitioners of medicine into two sects, which happened on the introduction of chemistry into medicine. Then the chemists, arrogating to themselves every kind of merit and ability, stirred up an opposition to their pretensions, founded on the invariable adherence of the other party to the ancient practice. And though this division into the two sects of galenists and chemists has long ceased, yet the distinction of medicines which resulted from it is still retained.

Galenical medicines are those which are formed by the easier preparations of herbs, roots, &c. by infusion, decoction, &c. and by combining and multiplying ingredients; while those of chemistry draw their more intimate and remote virtues by means of fire and elaborate preparations, as calcination, digestion, fermentation, &c.

GALENISTS, a denomination given to such physicians as practise, prescribe, or write, on the galenical principles; and stand opposed to the *chemists*. See GALENICAL. At present the galenists and chemists are pretty well accommodated; and most of our physicians use the preparations and remedies of both.

GALENISTS, or *Galenites*, in church-history, a branch of Mennonites or Anabaptists, who take in several of the opinions of the Socinians, or rather Arians, touching the divinity of our Saviour. In 1664 the Waterlandians were divided into two parties, of which the one were called *Galenists*, and the other *Apostolians*. They are thus called from their leader Abr. Galenus, a learned and eloquent physician of Amsterdam, who considered the Christian religion as a system that laid much less stress on faith than practice; and who was for taking into the communion of the Mennonites all those who acknowledged the divine origin of the books of the Old and New Testament, and led holy and virtuous lives.

GALEON. See GALLEON.

GALEOPSIS, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the

Galea
||
Galeopsis.

Galeri-
culum
Galileo.

42d order, *Verticillata*. The upper lip of the corolla is a little crenated or arched; the under lip more than bidentate.

GALERICULUM, was a cap worn both by men and women amongst the ancient Romans. It consisted of skin, which was so neatly dressed with human hair, that the artificial covering could scarcely be distinguished from the natural. It was used by those whose hair was thin; and by wrestlers, to keep their own hair from receiving any injury from the nasty oils with which they were rubbed all over before they exercised. It seems to have resembled our wigs.

GALIC, or *GÆLIC*, Language. See HIGHLANDS.

GALICIA, a province of Spain, bounded on the north and west by the ocean, on the south by Portugal, and on the east by Asturias and the kingdom of Leon. The air is temperate along the coast; but, in other places, it is cold and moist. It is but thin of people; and the produce is wine, flax, and citrons: here also are good pastures, copper, and lead; and the forests yield wood for building of ships. St Jago di Compostella is the capital town.

GALILEE, once a province of Judea, now of Turkey in Asia, was bounded by mount Lebanon on the north, by the river Jordan and the sea of Galilee on the east, by the Chison on the south, and by the Mediterranean on the west. It was the scene of many of our Saviour's miracles; but the bounds of the country are not now well known, nor yet the places where many of the towns stood.

GALILEANS, a sect of the Jews. Their founder was one Judas a native of Galilee, from which place they derived their name. Their chief, esteeming it an indignity for the Jews to pay tribute to strangers, raised up his countrymen against the edict of the emperor Augustus, which had ordered a taxation or enrolment of all the subjects of the Roman empire.

They pretended that God alone should be owned as Master and Lord, and in other respects were of the opinion of the Pharisees; but, as they judged it unlawful to pray for infidel princes, they separated themselves from the rest of the Jews, and performed their sacrifices apart.

As our Saviour and his apostles were of Galilee, they were suspected to be of the sect of Galileans; and it was on this principle, as St Jerome observes, that the Pharisees laid a snare for him; asking, Whether it was lawful to give tribute to Cæsar; that in case he denied it, they might have an occasion of accusing him.

GALILEO (Galilei), the famous mathematician and astronomer, was the son of a Florentine nobleman, and born in the year 1564. He had from his infancy a strong inclination to philosophy and the mathematics; and made prodigious progress in these sciences. In 1592, he was chosen professor of mathematics at Padua; and during his abode there he invented, it is said, the telescope; or, according to others, improved that instrument, so as to make it fit for astronomical observations: (See ASTRONOMY, p. 423, col. 1.) In 1611, Cosimo II. grand duke of Tuscany sent for him to Pisa, where he made him professor of mathematics, with a handsome salary; and soon after inviting him to Florence, gave him the office and title of principal philosopher and mathematician to his highness.

Nº 134.

He had been but a few years at Florence, before he was convinced by sad experience, that Aristotle's doctrine, however ill-grounded, was held too sacred to be called in question. Having observed some solar spots in 1612, he printed that discovery the following year at Rome; in which, and in some other pieces, he ventured to assert the truth of the Copernican system, and brought several new arguments to confirm it. For these he was cited before the inquisition; and, after some months imprisonment, was released upon a simple promise, that he would renounce his heretical opinions, and not defend them by word or writing. But having afterwards, in 1632, published at Florence his "Dialogues of the two greatest systems of the world, the Ptolemaic and Copernican," he was again cited before the inquisition, and committed to the prison of that ecclesiastical court at Rome. In June 32d N. S. that year, the congregation convened; and in his presence pronounced sentence against him and his books, obliging him to abjure his errors in the most solemn manner; committed him to the prison of their office during pleasure; and enjoined him, as a saving penance, for three years to come, to repeat once a-week the seven penitential psalms: reserving to themselves, however, the power of moderating, changing, or taking away altogether or in part, the abovementioned punishment and penance. On this sentence, he was detained a prisoner till 1634; and his "Dialogues of the system of the World" were burnt at Rome.

He lived ten years after this, seven of which were employed in making still further discoveries with his telescope. But by the continual application to that instrument, added to the damage he received in his sight from the nocturnal air, his eyes grew gradually weaker, till he became totally blind in 1639. He bore this calamity with patience and resignation, worthy of a great philosopher. The loss neither broke his spirit, nor hindered the course of his studies. He supplied the defect by constant meditation; whereby he prepared a large quantity of materials; and began to dictate his own conceptions; when, by a distemper of three months continuance, wasting away by degrees, he expired at Arcetti near Florence, in January 1642, N. S. in the 78th year of his age.

Among various useful inventions of which Galileo was the author, is that of the simple pendulum, which he had made use of in his astronomical experiments. He had thoughts of applying it to clocks; but did not execute it: the glory of that invention was reserved for Vicenzio his son, who made the experiment at Venice in 1649; and M. Huygens afterwards carried this invention to perfection. He wrote a great number of treatises, several of which were published in a collection by Signor Mendeſſi, under the title of *L'opera di Galileo Galilei Lynceo*. Some of these, with others of his pieces, were translated into English and published by Thomas Salisbry, Esq; in his mathematical collections, &c. in two volumes folio. A volume also of his letters to several learned men, and solutions of several problems, were printed at Bologna in quarto. Besides these, he wrote many others, which were unfortunately lost through his wife's devotion; who, solicited by her confessor, gave him leave to peruse her husband's manuscripts; of which he tore and took away as many as he said were not fit to be published.

GALINACEUS

GALINACEUS LAPIS. See GALLINACEUS.

GALIVM, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellata*. The corolla is monopetalous and plain; and there are two roundish seeds. There are a great many species; of which the most remarkable are, the *verum*, or yellow lady's bed-straw; and the *aperine*, clivers, or goose-grass. The former has a firm, erect, brown, square, stem; the leaves generally eight in each whirl, linear, pointed, brittle, and often reflex; branches short, generally two from each joint, terminating in spikes of small yellow flowers. It grows commonly in dry ground, and on road sides. The flowers will coagulate boiling milk; and the best Cheshire cheese is said to be prepared with them. The French prescribe them in hysteric and epileptic cases. Boiled in alum-water, they tinge wool yellow. The roots dye a red not inferior to madder; for which purpose they are used in the island of Jura. In the Edinburgh medical commentaries we have accounts of some violent scorbutic complaints being cured by the juice of this plant.—Sheep and goats eat the plant; horses and swine refuse it; cows are not fond of it. The *aperine*, or clivers, has a square, very rough, jointed, very weak stem, two, three, or four feet long, and adhesive: the branches are opposite; the joints hairy at the base: the leaves, consisting of eight or ten at each joint, are narrow, pointed, above rough, beneath smooth, and carinated: the seeds are rough; flowers white, small, few on slender foot-stalks on the tops of the branches. It is frequent in fields by the sides of hedges, &c. The expressed juice of this plant taken internally, and the bruised leaves applied by way of poultice, are said to have been used with success as a cure for the cancer. The effects being slow, though sure, the course, it is said, often requires to be continued for nine or ten months.

GALL, in the animal economy. See BILE.

Gall, was generally given amongst the Jews, to persons suffering death under the execution of the law, to make them less sensible of their pain; but gall and myrrh are supposed to have been the same thing; because at our Saviour's crucifixion, St Matthew says, they gave him vinegar to drink mingled with gall; whereas St Mark calls it wine mingled with myrrh: The truth of the matter perhaps is, that they distinguished every thing bitter by the name of gall. The Greeks and Romans also gave such a mixture to persons suffering a death of torture.

A great number of experiments have been made upon the gall of different animals, but few conclusions can be drawn from them with any certainty. Dr Percival, however, hath shown, that putrid bile may be perfectly corrected and sweetened by an admixture of the vegetable acids, vinegar, and juice of lemons. These, he observes, have this effect much more completely than the mineral ones: and hence, he thinks, arises the great usefulness of the vegetable acids in autumnal diseases; which are always attended with a putrescent disposition of the bile, owing to the heat of the preceding summer. On this occasion he takes notice of a common mistake among physicians, who frequently prescribe elixir of vitriol in those diseases, where vinegar or lemon juice would be much more effectual.

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From this effect of acids on the gall, he also thinks, we may see why the immoderate use of acids is so pernicious to digestion. It is necessary to health that the gall should be in some degree acrid and alkalescent: but as acids have the property of rendering it perfectly mild and sweet, they must be proportionably pernicious to the due concoction and assimilation of the food; which without an acrid bile cannot be accomplished. Hence the body is deprived of its proper nourishment and support, the blood becomes vapid and watery, and a fatal cachexy unavoidably ensues. This hath been the case with many unfortunate persons, who, in order to reduce their excessive corpulency, have indulged themselves in the too free use of vinegar. From the mild state of the gall in young children, Dr Percival also thinks it is, that they are so much troubled with acidities.

GALL Bladder. See ANATOMY, n° 97.

GALL, in natural history, denotes any protuberance or tumor produced by the puncture of insects on plants and trees of different kinds.

These galls are of various forms and sizes, and no less different with regard to their internal structure. Some have only one cavity, and others a number of small cells communicating with each other. Some of them are as hard as the wood of the tree they grow on, whilst others are soft and spongy; the first being termed *gall nuts*, and the latter *berry galls*, or *apple-galls*.

The general history of the gall is this. An insect of the fly kind * is instructed by nature to take care for the safety of her young, by lodging her eggs in a woody substance, where they will be defended from all injuries: she for this purpose wounds the leaves or tender branches of a tree; and the lacerated vessels, discharging their contents, soon form tumors about the holes thus made. The external coat of this excrescence is dried by the air; and grows into a figure which bears some resemblance to the bow of an arch, or the roundness of a kernel. This little ball receives its nutriment, growth, and vegetation, as the other parts of the tree; by slow degrees, and is what we call the *gall-nut*. The worm that is hatched under this spacious vault, finds in the substance of the ball, which is as yet very tender, a subsistence suitable to its nature; gnaws and digests it till the time comes for its transformation to a nymph, and from that state of existence changes into a fly. After this, the insect, perceiving itself duly provided with all things requisite, disengages itself soon from its confinement, and takes its flight into the open air. The case, however, is not similar with respect to the gall-nut that grows in autumn. The cold weather frequently comes on before the worm is transformed into a fly, or before the fly can pierce through its inclosure. The nut falls with the leaves: and although you may imagine that the fly which lies within is lost, yet in reality it is not so; on the contrary, its being covered up so close, is the means of its preservation. Thus it spends the winter in a warm house, where every crack and cranny of the nut is well stopped up; and lies buried as it were under a heap of leaves, which preserves it from the injuries of the weather. This apartment, however, though so commodious a retreat in the winter, is a perfect prison in the spring. The fly, roused out of its lethargy by the first

Gall,
Galla.

heats, breaks its way through, and ranges where it pleases. A very small aperture is sufficient, since at this time the fly is but a diminutive creature. Besides, the ringlets whereof its body is composed, dilate and become pliant in the passage.

Oak galls put, in a very small quantity, into a solution of vitriol in water, though but a very weak one, give it a purple or violet colour: which, as it grows stronger, becomes black; and on this property depends the art of making our writing ink, as also the arts of dying and dressing leather, and other manufactures. See *INK*.

The best galls come from Aleppo: these are not quite round and smooth like the other sorts, but have several tubercles on the surface. Galls have a very austere styptic taste, without any smell: they are very strong astringents, and as such have been sometimes made use of both internally and externally, but are not much taken notice of by the present practice. Some recommend an ointment of powdered galls and hog's lard as very effectual in certain painful states of hæmorrhoids; and it is alleged, that the internal use of galls has cured intermittents after the Peruvian bark has failed. A mixture of galls with a bitter and aromatic has been proposed as a substitute for the bark.

GALL (St), a considerable town in Swisserland, and in the Upper Thurgow, with a rich and celebrated abbey, whose abbot is a prince of the empire. This place has for some time been a republic, in alliance with the Cantons. It is not very large; but is well built, neat, populous. It contains about 10,000 inhabitants, who are chiefly employed in the linen manufacture; and make annually, it is said, 40,000 pieces of linen, of 200 ells each; which renders it one of the richest towns in Swisserland. The inhabitants are Protestants; for which reason there are often great contests between them and the abbey about religious affairs. It is seated in a narrow barren valley, between two mountains, and upon two small streams. E. Long. 29. 5. N. Lat. 47. 38.

GALL-FLY. See *CYNIPS*.

GALLA, an Abyssinian nation, originally dwelling, as Mr Bruce supposes, under the line, and exercising the profession of shepherds, which they still continue to do. For a number of years, our author tells us, they have been constantly migrating northwards, though the cause of this migration is not known. At first they had no horses; the reason of which was, that the country they came from did not allow these animals to breed: but as they proceeded northward and conquered some of the Abyssinian provinces, they soon furnished themselves with such numbers, that they are now almost entirely cavalry, making little account of infantry in their armies. On advancing to the frontiers of Abyssinia, the multitude divided, and part directed their course towards the Indian Ocean; after which, having made a settlement in the eastern part of the continent, they turned southward into the countries of Bali and Dawaw, which they entirely conquered, and settled there in the year 1537. Another division having taken a westerly course, spread themselves in a semicircle along the banks of the Nile; surrounding the country of Gojam, and passing eastward behind the country of the Agows, extended their possessions as far as the territories of the Gongas and Gasats.

Since that time the Nile has been the boundary of their possessions; though they have very frequently plundered, and sometimes conquered, the Abyssinian provinces on the other side of the river, but have never made any permanent settlement in these parts. A third division has settled to the southward of the low country of Shoa, which the governor of that province has permitted, in order to form a barrier betwixt him and the territories of the emperor, on whom he scarcely acknowledges any dependence.

The Galla are of a brown complexion, and have long black hair; but some of them who live in the valleys are entirely black. At first their common food was milk and butter; but since their intercourse with the Abyssinians, they have learned to plough and sow their land, and to make bread. They seem to have a predilection for the number seven, and each of the three divisions already mentioned are subdivided into seven tribes. In their behaviour they are extremely barbarous; and live in continual war with the Abyssinians, whom they murder without mercy as often as they fall into their hands. They cut off the privities of the men, and hang them up in their houses by way of trophies; and are so cruel as to rip up women with child, in hopes of thus destroying a male. Yet notwithstanding their excessive cruelty abroad, they live under the strictest discipline at home; and every broil or quarrel is instantly punished according to the nature of the offence. Each of the three divisions of the Galla above mentioned has a king of its own; and they have also a kind of nobility, from among whom the sovereign can only be chosen: however, the commonalty are not excluded from rising to the rank of nobles if they distinguish themselves very much in battle. None of the nobility can be elected till upwards of 40 years of age, unless he has with his own hand killed a number of enemies which added to his own age makes up 40. There is a council of each of the seven tribes, which meets separately in its own district, to settle how many are to be left behind for the governing and cultivating of the territory, and other matters of importance. These nations have all a great veneration for a tree which grows plentifully in their country, called *wanzey*, and which these superstitious people are even said to adore as a god. Their assemblies for the choice of a king are all held under one of these trees; and when the sovereign is chosen, they put a bludgeon of this wood in his hand by way of sceptre, and a garland of the flowers upon his head.

The Galla are reported to be very good soldiers, especially in cases of surprise; but, like most other barbarians, have no constancy nor perseverance after the first attack. They will, however, perform extraordinary marches, swimming rivers holding by the horse's tail, and thus being enabled to do very great mischief by reason of the rapidity of their movements. They are excellent light-horse for a regular army in an hostile country; but are very indifferently armed on account of the scarcity of iron among them. Their principal arms are lances made of wood sharpened at the end, and hardened in the fire; and their shields are composed only of one single fold of bull's hide; so that they are extremely apt to warp by heat, or become too soft in wet weather. They are exceedingly cruel; and make a shrill horrid noise at the beginning of every

Galla.

Gall
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Galle.

every engagement, which greatly terrifies the horses, and very often the barbarous riders which oppose them.

The Galla, according to Mr Bruce's account, are somewhat below the middle size, but extremely light and nimble. The women are fruitful; and suffer so little in child-bearing, that they do not even confine themselves for a single day after delivery. They plough, sow, and reap the corn, which is trodden out by the cattle; but the men have all the charge of the cattle in the fields. In their customs they are filthy to the last degree; plaiting their hair with the guts of oxen, which they likewise twist round their middle, and which by the quick putrefaction occasion an abominable stench. They anoint their heads and whole bodies with butter or grease; in which, as well as in other respects, they greatly resemble the Hottentots. It has been supposed that they have no religion whatever; but Mr Bruce is of opinion that this is a mistake. The wanzey, he says, is undoubtedly worshipped by all the nations as a god; and they have likewise certain stones which are worshipped as gods: besides these, they worship the moon, and some stars, when in certain positions, and at some particular seasons of the year. They all believe in a resurrection; and have some faint notions of a state of happiness, but no idea of future punishment. Some of them to the southward profess the Mahometan religion, but those to the east and west are generally pagans. All of them intermarry with each other; but will not allow strangers to live among them, though the Moors have at last found out a method of trading safely with them. The commodities they deal in are blue Surat cloths, myrrh, and salt; the last being the most valuable article.

The marriages among the Galla are celebrated with some of the disgusting customs of the Hottentots; and after these ceremonies the bridegroom promises to give the bride meat and drink while she lives, and to bury her when dead. Polygamy is allowed among them; but it is singular, that among these people the women solicit their husbands to take others to their embraces. The reason of this custom is, that the men may have numerous families of children, who may be capable of defending them against their enemies; as the Galla, according to our author, always fight in families, whether against foreign enemies or with one another.

GALLAND (Anthony), a learned antiquarian, member of the Academy of Inscriptions, and professor of Arabic in the Royal College of Paris, was born of poor parents at Rollo, a village in Picardy. Having studied at the Sorbonne and other universities, he travelled into the east; where he acquired great skill in the Arabic tongue, and in the manners of the Mahometans. He wrote several works; the principal of which are, 1. An Account of the Death of the Sultan Osman, and the Coronation of the Sultan Mustapha. 2. A Collection of Maxims, drawn from the works of the Orientals. 3. A Treatise on the Origin of Coffee. 4. The Arabian Nights Entertainments, &c.

GALLANT, or GALANT, a French term adopted into our language, and signifying polite, civil, and well-bred, with a disposition to please, particularly the ladies. It also signifies brave or courageous.

GALLE, the name of several engravers, of whom the principal was Cornelius, who flourished about the

1600. He learned the art of engraving from his father, and imitated his stiff style, till he went to Rome, where he resided a considerable time, and there acquired that freedom, taste, and correctness of drawing, which are found in his best works. He settled at Antwerp upon his return from Italy, where he carried on a considerable commerce in prints. His best prints are those done after Rubens.

GALLEON, in naval affairs, a sort of ships employed in the commerce of the West Indies. The Spaniards send annually two fleets; the one for Mexico, which they call the *flota*; and the other for Peru, which they call the *galleons*. See *FLOTA*.

By a general regulation made in Spain, it has been established, that there should be twelve men of war and five tenders annually fitted out for the armada or galleons; eight ships of 600 tons burden each, and three tenders, one of 100 tons, for the island Margarita, and two of 80 each, to follow the armada; for the New Spain fleet, two ships of 600 tons each, and two tenders of 80 each; and for the Honduras fleet, two ships of 500 tons each: and in case no fleet happened to sail any years, three galleons and a tender should be sent to New Spain for the plate.

They are appointed to sail from Cadiz in January, that they may arrive at Porto Bello about the middle of April; where, the fair being over, they may take aboard the plate, and be at Havannah with it about the middle of June; where they are joined by the *flota*, that they may return to Spain with the greater safety.

GALLEOT, a small galley designed only for chace, carrying but one mast and two pattereroes; it can both sail and row, and has 16 or 20 oars. All the seamen on board are soldiers, and each has a musket by him on quitting his oar.

GALLERY, in architecture, a covered place in a house, much longer than broad, and usually in the wings of a building; its use being chiefly to walk in.

GALLERIES, in gardening, are certain ornaments made with trees of different kinds; which are very common in all the French gardens, but are seldom introduced into the British ones, especially since the taste for clipped trees has been exploded. For those, however, who may still choose to have them, Mr Miller gives the following directions.

In order to make a gallery in a garden with porticoes and arches, a line must first be drawn of the length you design the gallery to be; which being done, it is to be planted with hornbeam, as the foundation of the gallery. The management of galleries is not difficult. They require only to be digged round about; and sheared a little when there is occasion. The chief curiosity required is in the ordering the forepart of the gallery, and in forming the arches. Each pillar of the porticoes or arches ought to be four feet distant from another, and the gallery 12 feet high and 10 feet wide, that there may be room for two or three persons to walk abreast. When the hornbeams are grown to the height of three feet, the distance of the pillars well regulated, and the ground-work of the gallery finished, the next thing to be done is to form the frontispiece; to perform which, you must stop the hornbeam between two pillars for that purpose, which forms the arch. As it grows, you must with your sheers cut off those

Galleon
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Galleries.

Gallery,
Galley.

boughs which outshoot the others. In time they will grow strong, and may be kept in form by the sheers. Portico-galleries may be covered with lime-trees.

GALLERY, in fortification, a covered walk across the ditch of a town, made of strong beams covered over with planks, and loaded with earth: sometimes it is covered with raw hides, to defend it from the artificial fires of the besieged.

GALLERY of a Mine, is a narrow passage or branch of a mine carried on under ground to a work designed to be blown up. See **MINE**.

GALLERY, in a ship, that beautiful frame, which is made in the form of a balcony, at the stern of a ship without board; into which there is a passage out of the admiral's or captain's cabin, and is for the ornament of the ship.

GALLEY, a kind of low flat-built vessel, furnished with one deck, and navigated with sails and oars, particularly in the Mediterranean. By the Greek authors under the eastern empire, this kind of vessel was called γαλαία and γαλαία; and by the Latin authors of the same time, *galea*; whence, according to some, the modern denomination. Some say it was called *galea*, on account of a cask or helmet which it carried on its prow, as Ovid attests, *de Triflib*. The French call it *galere*; by reason, they say, that the top of the mast is usually cut in the form of a hat, which the Italians call *galero*. Others derive both *galea*, and *galere*, from a fish by the Greeks called γαλιόρως, or γαλιός, and by us the *sword-fish*, which this vessel resembles. Lastly, others derive the *galley*, *galea*, *galere*, *galeasse*, &c. from the Syriac and Chaldee *gaul*, and *gallin*, a man exposed on the water in a vessel of wood.

The largest sort of these vessels is employed only by the Venetians. They are commonly 162 feet long above, and 133 feet by the keel; 32 feet wide, with 23 feet length of stern-post. They are furnished with three masts, and 32 banks of oars; every bank containing two oars, and every oar being managed by six or seven slaves, who are usually chained thereto. In the fore-part they have three little batteries of cannon, of which the lowest is of two 36 pounders, the second of two 24 pounders, and the uppermost of two 2 pounders: three 18 pounders are also planted on each quarter. The complement of men for one of these galleys is 1000 or 1200. They are esteemed extremely convenient for bombarding or making a descent upon an enemy's coast, as drawing but little water; and having by their oars frequently the advantage of a ship of war, in light winds or calms, by cannonading the latter near the surface of the water; by scouring her whole length with their shot, and at the same time keeping on her quarter or bow, so as to be out of the direction of her cannon.

The galleys next in size to these, which are also called *half-galleys*, are from 120 to 130 feet long, 18 feet broad, and 9 or 10 feet deep. They have two masts, which may be struck at pleasure; and are furnished with two large lateen sails, and five pieces of cannon. They have commonly 25 banks of oars, as described above. A size still less than these are called *quarter-galleys*, carrying from 12 to 16 banks of oars. There are very few galleys now besides these in the Mediterranean, which are found by experience to be of

little utility except in fine weather; a circumstance which renders their service extremely precarious. They generally keep close under the shore, but sometimes venture out to sea to perform a summer cruise.

GALLER-Worm, in zoology. See **LULUS**.

GALLI, in antiquity, a name given to the priests of Cybele, from the river Gallus in Phrygia; but of the etymology of the name we have no certain account. All that we learn with certainty about them is, that they were eunuchs and Phrygians, and that in their solemn processions they danced, bawled, drummed, cut and slashed themselves, playing upon timbrels, pipes, cymbals, &c. and driving about an ass loaded with the sacred rites and trumpery of their goddesses. When a young man was to be initiated, he was to throw off his cloaths, run crying aloud into the midst of their troop, and there draw a sword and castrate himself; after this he was to run into the street with the parts cut off, in his hand, throw them into some house, and in the same house put on a woman's dress.

These priests had the names also of *Curetes*, *Corybantes*, and *Dactyli*. The chief priest was called *Archi-Gallus*. This order of priesthood is found both amongst Greeks and Romans. See an account of them in *Lucret*. lib. ii. and *Juv.* sat. vi.

GALLI, the *Gauls*. See **GALLIA** and **GAULS**.

GALLI, five small desolate islands on the coast of the Principato Citra of Naples. They are supposed to be the Syrenusæ, or islands once inhabited by the Sirens, which Ulysses passed with so much caution and hazard. Great revolutions, however, have been occasioned in their shape, size, and number, by the effects of subterranean fire; and some learned persons go so far as to assert, that these rocks have risen from the bottom of the sea since Homer sang his rhapsodies; consequently, that those monsters dwelt on some other spot, probably Sicily or Capri. The tradition of Sirens residing hereabouts is very ancient and universally admitted; but what they really were, divested of their fabulous and poetical disguise, it is not easy to discover. See **SIREN**.

The Sirenusæ were only three in number; and therefore if these and the Galli be the same, two more must have since risen, or the three have been split into five by a subterraneous convulsion. On the largest is a watch-tower, and the next has a deserted hermitage. The principal island is only a narrow semicircular ridge covered with a shallow coat of soil; two other little islands and some jagged rocks just peeping above the waves, correspond with this one so as to trace the outline of a volcanical crater. The composition of them all is at top a calcareous rock extremely shaken, tumbled, and confused, mixed with masses of breccia, disposed in a most irregular manner; below these is lava, and the deeper the eye follows it the stronger are the marks of fire: below the surface of the water, and in some places above it, the layers are complete blocks of basalt. Hence it is fair to presume, that central fires have heaved up to light the torrifed substances that originally lay near their focus, with all the intermediate strata that covered them from the sea. The layers incline downwards from east to west; the air seems to have forced its way into part of the mass while in fusion, and by checking its workings caused many large caverns

Galley,
Galli.

Gallia
Galliard

caverns to be left in it. These islands are uncultivated and uninhabited since the old hermit of St Antonio died. Myrtle covers most of the surface.

GALLIA, a large country of Europe, called *Gallia* by the Greeks. The inhabitants were called *Galli*, *Celta*, *Celtiberi*, and *Celtschyba*. Ancient Gaul was divided into four different parts by the Romans, called *Gallia Belgica*, *Narbonensis*, *Aquitania*, and *Celtica*. *Gallia Belgica* was the largest province, bounded by Germany, *Gallia Narbonensis*, and the German ocean; and contained the modern country of Alsace, Lorraine, Picardy, with part of the low countries, and of Champagne, and of the isle of France. *Gallia Narbonensis*, which contained the provinces now called *Languedoc*, *Provence*, *Dauphiné*, *Savoy*, was bounded by the Alps and Pyrenean mountains, by *Aquitania*, *Belgium*, and the Mediterranean. *Aquitania Gallia*, now called the provinces of *Poitou*, *Saintonge*, *Guienne*, *Berry*, *Limosin*, *Gascogny*, *Auvergne*, &c. was situated between the *Garumna*, the Pyrenean mountains, and the ocean. *Gallia Celtica*, or *Lugdunensis*, was bounded by *Belgium*, *Gallia Narbonensis*, the Alps, and the ocean. It contained the country at present known by the name of *Lyonnois*, *Touraine*, *Franche Comté*, *Senenois*, *Switzerland*, and part of *Normandy*. Besides these grand divisions, there is often mention made of *Gallia Cisalpinga* or *Citerior*, *Transalpinga* or *Uterior*, which refers to that part of Italy which was conquered by some of the Gauls who crossed the Alps. By *Gallia Cisalpinga*, the Romans understood that part of Gaul which lies in Italy, and by *Transalpinga*, that which lies beyond the Alps, in regard only to the inhabitants of Rome. *Gallia Cispadana*, and *Transpadana*, is applied to a part of Italy conquered by some of the Gauls; and then it means the country on this side of the Po, or beyond the Po, with respect to Rome. By *Gallia Togata*, the Romans understood *Cisalpine Gaul*, where the Roman gowns *toga* were usually worn. *Gallia Narbonensis* was called *Braccata*, on account of the peculiar covering of the inhabitants for their thighs. The epithet of *Comata* is applied to *Gallia Celtica*, because the people suffered their hair to grow to an uncommon length. The inhabitants were great warriors, and their valour overcame the Roman armies, took the city of Rome, and invaded Greece in different ages. They spread themselves over the greatest part of the world. They were very superstitious in their religious ceremonies, and revered the sacerdotal order as if they had been gods. They long maintained a bloody war against the Romans, and Cæsar resided 10 years in their country before he could totally subdue them. See GAUL.

GALLIARD, or GAGLIARDA, a sort of dance anciently in great request; consisting of very different motions and actions, sometimes proceeding *terra à terra* or smoothly along; sometimes capering; sometimes along the room, and sometimes acrois. The word is French, *galliarde*, or rather Italian; and literally signifies "gay, merry, sprightly." This dance was also called *Romanesque*, because brought from Rome.

Thoinot Arbeau, in his *Orchesography*, describes it as consisting of five steps, and five positions of the feet, which the dancers performed before each other, and

whereof he gives us the score or tablature, which is of six minims, and two triple times.

GALLIARDA, in the Italian music, the name of a tune that belongs to a dance called a *galliard*. The air of it is lively in triple time.

GALLICAN, any thing belonging to France: thus the term *Gallican church* denotes the church of France, or the assembly of the clergy of that kingdom.

GALLICISM, a mode of speech peculiar to the French language, and contrary to the rules of grammar in other languages. With us it is used to denote such phrases or modes of speech in English as are formed after the French idiom.

GALLINACEUS LAPIS, a glossy substance produced by volcanic fires; the same with the *lapis obsidianus* of the ancients. A kind of it is brought from Paris, of a beautiful black, resembling the colour of a large crow in that country named *gallinago*.

GALLINÆ, in ornithology, an order of birds. See ORNITHOLOGY.

GALLINACIOUS, an appellation given to the birds of the order of the *gallinæ*.

GALLING, or EXCORIATION, in medicine. See EXCORIATION.

GALLING of a Horse's Back, a disorder occasioned by heat, and the chafing or pinching of the saddle.

In order to prevent it, some take a hind's skin well garnished with hair, and fit it neatly under the pannel of the saddle, so that the hairy side may be next the horse.

When a horse's back is galled upon a journey, take out a little of the stuffing of the pannel over the swelling, and sew a piece of soft white leather on the inside of the pannel: anoint the part with salt butter, and every evening wipe it clean, rubbing it till it grow soft, anointing it again with butter, or, for want of that, with grease: wash the swelling, or hurt, every evening with cold water and soap; and strew it with salt, which should be left on till the horse be saddled in the morning.

GALLINULE. See FULICA.

GALLIPOLI, a sea-port town of Italy, in the kingdom of Naples, and in the Terra-di-Otranto, with a bishop's see. It stands on a rocky island, joined to the continent by a bridge. From the remotest antiquity this was a station so favourable to commerce, that every maritime power wished to secure it; and it is a reproach to government, that nothing has been done to improve its natural advantages: at present, Mr Swinburn informs us, it has neither harbour nor shelter for shipping. Charles II. demolished Gallipoli for its adherence to Frederick of Aragon. The Venetians treated it with great cruelty in the 15th century; and in 1481 it was pillaged by the Turks. To preserve it from future calamities, Charles V. repaired and strengthened its fortifications; and, since that period, it has enjoyed the benefits of peace and trade, which have rendered it the most opulent and gayest town upon the coast, though its inhabitants do not exceed 6000 in number. Consumptions and spitting of blood are rather frequent here, occasioned by the great subtilty of the air, which is ventilated from every quarter. The buildings are tolerable, and some of

Galliard
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Gallipoli.

Gallipoli
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Gallois.

of the churches have good paintings. The cotton trade brings in about 30,000 ducats a year. Good muslins, cotton stockings, and other parts of apparel, are manufactured here, and purchased by the Provençals; for Gallipoli has no direct trade with the metropolis. Silk and saffron were formerly objects of traffic; but heavy duties and oppression have caused them to be abandoned. The wine of this territory is good; but from dryness of climate, and shallowness of soil, the vintage frequently fails in quantity; and then the Gallipolitans have recourse to Sicily for a supply. Oil is the great support of the place: two-thirds of the produce of its olive plantations are exported to France, and the north of Italy; the remainder is sent to Naples, and other parts of the kingdom. Neapolitan merchants, by means of agents settled at Gallipoli, buy up the oils, from year to year, long before an olive appears upon the tree; and the price is afterwards settled by public authority. The Neapolitans sell their oil to the merchants of Leghorn; and, if faithfully served by their factors in Terra di Otranto, ought to double their capital in two years. But, to balance this advantage, they run great risks, pay exorbitant interest, and have frequent bankruptcies to guard against. E. Long. 18. 10. N. Lat. 40. 20.

GALLIPOLI, a sea-port town of Turkey in Europe, in the province of Romania, seated at the mouth of the sea of Marmura, with a good harbour, and a bishop's see. It contains about 10,000 Turks, 3500 Greeks, besides a great number of Jews. The bazar or bezeitein, the place where merchandizes are sold, is a handsome structure, with domes covered with lead. It is an open place, and has no other defence than a paltry square castle. The houses of the Greeks and Jews have doors not above three feet and an half high, to prevent the Turks riding into their houses. E. Long. 26. 59. N. Lat. 40. 30.

GALLIUM, in botany. See GALIUM.

GALLO, an island of the South Sea, near the sea-coast of Peru, in South America, which was the first place possessed by the Spaniards when they attempted the conquest of Peru; it is also the place where the bucaners used to come for wood and water, and to refit their vessels when they were in these parts. W. Long. 88. 0. N. Lat. 2. 30.

GALLO-Græcia, a country of Asia Minor, near Bithynia and Cappadocia. It was inhabited by a colony of Gauls, who assumed the name of *Gallogræci* because a number of Greeks had accompanied them in their emigration. See GALATIA.

GALLOIS (John), born at Paris in 1632, was an universal scholar; but chiefly noted for having been, in conjunction with M. de Sallo who formed the plan, the first publisher of the *Journal des Sçavans*. The first journal was published January 5. 1665; but these gentlemen criticised new works so rigorously, that the whole tribe of authors united and cried it down. De Sallo declined entirely after the publication of the third number: but Gallois ventured to send out a fourth, on January 4th. 1666; though not without a most humble advertisement at the beginning, wherein it was declared, that the author "would not presume to criticise, but simply give an account of the books."

This, with the protection of M. Colbert, who was greatly taken with the work, gradually reconciled the public to it: and thus began literary journals, which have been continued from that time to this, under various titles, and by various writers. Gallois continued his journal to the year 1674, when more important occupations obliged him to turn it over to other hands. M. Colbert had taken him into his house to teach him Latin; and when he lost his patron in 1683, he was first made librarian to the king, and then Greek professor in the royal college. He died in 1707.

GALLON, a measure of capacity both for dry and liquid things, containing four quarts. But these quarts, and consequently the gallon itself, are different, according to the quality of the thing measured: For instance, the wine-gallon contains 231 cubic inches, and holds eight pounds averdupois of pure water; the beer and ale gallon contains 281 solid inches, and holds ten pounds three ounces and a quarter averdupois of water; and the gallon for corn, meal, &c. 272½ cubic inches, and holds nine pounds thirteen ounces of pure water.

GALLOP, in the manege, is the swiftest natural pace of a horse, performed by reaches or leaps; the two fore-feet being raised almost at the same time; and when these are in the air, and just ready to touch the ground again, the two hind-feet are lifted almost at once. The word is borrowed from the barbarous Latin *calupare*, or *calpare*, "to run." Some derive it from *caballicare*; others from the Greek *καλπαζειν*, or *καλπειν*, to spur a horse.

GALLOPER, in artillery, is the name of a carriage which serves for a pound and a half gun. This carriage has shafts so as to be drawn without a limber, and is thought by some to be more convenient and preferable to other field carriages; and it may likewise serve for our light three and six pounders.

GALLOWAY, a county of Scotland, which gives the title of Earl to a branch of the noble family of Stuart. It is divided into two districts; the western, called *Upper Galloway*, being the same with Wigtonshire; and the eastern, or stewartry of Kirkcudbright, called *Lower Galloway*. See KIRKCUDBRIGHT and WIGTONSHIRE.

Mull of Galloway, the south cape or promontory of all Scotland, in the county of Galloway, on the Irish sea.

GALLOWAYS is the name of a peculiar sort of horses, so called from the county of Galloway in Scotland, where they are bred. Tradition reports that this kind of horses sprung from some Spanish stallions, which swam on shore from some of the ships of the famous Spanish armada, wrecked on the coast; and coupling with the mares of the country, furnished the kingdom with their posterity. They were much esteemed, and of a middling size, strong, active, nervous, and hardy.

GALLOWES, an instrument of punishment, whereon persons convicted capitally of felony, &c. are executed by hanging.

Among our ancestors it was called *furca*, "fork;" a name by which it is still denominated abroad, particularly in France and Italy. In this latter country, the

Gallon.
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Gallows.

Gallus
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Galway.

the reason of the name still subsists; the gallows being a real fork drove into the ground, across the legs whereof is laid a beam, to which the rope is tied. See *FURCA*.

GALLUS (Cornelius), an ancient Roman poet, born at Forum Julium, now called *Frejus*, in France. He was a particular favourite with Augustus Cæsar, who made him governor of Egypt: but his mal-administration there occasioned his banishment, and the loss of his estate; for grief of which he put an end to his own life. He wrote four books of love-elegies; and Virgil has complimented him in many places.

GALLUS, or **Cock**, in ornithology. See *PHASIANUS*.

GALLY, in printing, a frame into which the compositor empties the lines out of his composing-stick, and in which he ties up the page when it is completed.

The gally is formed of an oblong square board, with a ledge on three sides, and a groove to admit a false bottom, called a *gally-slice*.

GALWAY, or **GALLOWAY**, a county of Ireland, which is 82 miles in length, and 42 in breadth, bounded by the counties of Clare, Tipperary, King's County, Roscommon, and the sea. The river Shannon washes the frontiers of the east and south-east, and forms a lake several miles in length. There is another great lake called *Corbis*, or *Carib*, which is near 20 miles long, and five broad. The county contains 15,420 houses, 136 parishes, 17 baronies, and 13 boroughs; and sends 8 members to parliament. The capital town is of the same name.

GALWAY, a town of Ireland, in the county of the same name, and province of Connaught, of which it is the capital. It is seated on the bay of Galway on the western ocean, 108 miles west of Dublin, and gives title of Viscount to the family of Monkton. It is surrounded with strong walls, has large straight streets, and the houses are generally well built with stone. It has a good trade into foreign parts, on account of its harbour, which is defended by a fort. It is governed by a mayor, sheriffs, and recorder, and returns two members to parliament. It has but one parish church, which is a large and beautiful Gothic structure; an exchange; barracks for 10 companies of foot, a charter-school, and an hospital. This was one of the strongest towns in the kingdom: it held out some time against general Ginkle, who invested and took it after the battle of Aughrim. Its fortifications were then repaired; the walls are flanked by bastions, but are mostly gone to decay. The salmon and herring fisheries are carried on here with great spirit, and employ 700 boats, the quantity of kelp manufactured and exported is considerable; and the growth of the linen manufacture, though of late introduction, is become very important. In 1296, Sir William de Burgh founded a monastery here for Franciscan friars, on St Stephen's island, situated without the north gate of the town. In 1381, there being two popes at Rome, and the people of Ireland being doubtful to which they should pay obedience, pope Urban, to fix them entirely to his interest, empowered the guardian of this monastery to excommunicate every person in the province of Connaught who should adhere to Cle-

ment VII. who he assured them was antipope: The tomb of the founder of this monastery was discovered in June 1779, upwards of four feet under ground, with his family-arms, and a very long broad sword, elegantly carved thereon; some of the remains are still to be seen.—Near the west gate of the town, without the walls, was the monastery of St Mary of the hill: on the nuns forsaking it, the secular clergy entered into and kept possession of it for a considerable time; but on the petition of the inhabitants of the town, to pope Innocent VIII. it was granted to the Dominican friars, by a bull dated the 4th December 1488; there are no remains of this foundation except the cemetery; the whole building having been demolished by the townsmen in the year 1652, in order to prevent Cromwell from turning it into a fortification against themselves: there was also an Augustinian friary, on a hill near this town, founded by Stephen Lynch, and Margaret his wife, in the year 1508, at the earnest solicitation of Richard Nangle, a friar of the same order, who afterwards became archbishop of Tuam.

GAMA (Vasco de), a Portuguese admiral, celebrated for his discovery of the East Indies by the Cape of Good Hope, was born at Synes; and, in 1497, was sent to the Indies by king Emanuel: he returned in 1502, and sailed thither again with 13 vessels richly laden. He was made viceroy of the Indies by king John III.; and died at Cochín, on the 24th of December 1525. Don Stephen and Don Christopher de Gama, his sons, were also viceroys of the Indies, and celebrated in history.

GAMBIA, a large river of Negroland in Africa, generally supposed to be a branch of the Niger. See *NILE*, *NIGER*, and *SENEGAL*.

GAMBOGE, is a concreted vegetable juice *, * See *Gambogia*. partly of a gummy and partly of a resinous nature. It is chiefly brought to us in large cakes or rolls from Cambaja in the East Indies. The best sort is of a deep yellow or orange colour, breaks shining and free from dross: it has no smell, and very little taste, unless kept in the mouth for some time, when it impresses a slight sense of acrimony. It immediately communicates to spirit of wine a bright golden colour, and almost entirely dissolves in it; Geoffroy says, except the sixth part. Alkaline salts enable water to act upon this substance powerfully as a menstruum: the solution made by their means is somewhat transparent, of a deep blood-red colour, and passes the filtre: the dulcified spirit of sal ammoniac readily and entirely dissolves it, and takes up a considerable quantity; and what is pretty remarkable, this solution mixes either with water or spirit, without growing turbid.

As a pigment, it makes a beautiful yellow, which is much used by the painters. Dr Lewis says, that it makes a beautiful and durable citron-yellow stain upon marble, whether rubbed in substance on the hot stone, or applied, as dragon's blood sometimes is, in form of a spirituous tincture. When it is applied on cold marble, the stone is afterwards to be heated, to make the colour penetrate.

As a medicine, gamboge evacuates powerfully both upwards and downwards; some condemn it as acting with too great violence, and occasioning dangerous hypercathartes; whilst others are of a contrary opinion. Geoffroy seems particularly fond of this medicine.

Gama
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Gamboge.

Game.

cine, and informs us, that he has frequently given from two to four grains, without its proving at all emetic; that from four to eight grains, it both vomits and purges, without violence; that its operation is soon over; and that if given in a liquid form, and sufficiently diluted, it stands not in need of any corrector; that in the form of a bolus or pill, it is most apt to prove emetic, but very rarely has this effect if joined along with *mercurius dulcis*. He nevertheless cautions against its use where the patient cannot easily bear vomiting.—It has been used in dropsy with cream of tartar or jalap, or both, to quicken their operation. It is also recommended by some to the extent of 15 grains with an equal quantity of vegetable alkali in cases of the tape-worm. This dose is ordered in the morning; and if the worm is not expelled in two or three hours, it is repeated even to the third time with safety and efficacy. It is asserted that it has been given to this extent even in delicate habits. This is said to be the remedy alluded to by Baron Van Swieten, which was employed by Dr Herenschward, and with him proved so successful in the removal of the *tænia lata*.

GAME, in general, signifies any diversion or sport, that is performed with regularity, and restrained to certain rules. See GAMING.

Games are usually distinguished into those of exercise and address, and those of hazard. To the first belong chess, tennis, billiards, &c. and to the latter those performed with cards or dice, as back-gammon, ombre, picquet, whist, &c. See BACK-GAMMON, &c.

GAMES, in antiquity, were public diversions, exhibited on solemn occasions. Such among the Greeks, were the Olympic, Pythian, Isthmian, Nemean, &c. games; and, among the Romans, the Apollinarian, Circensian, Capitoline, &c. games. See OLYMPIC, PYTHIAN, FUNERAL, &c.

GAME, in law, signifies birds, or prey, taken or killed by fowling or hunting.

The property of such animals *fera nature* as are known under the denomination of *game*, with the right of pursuing, taking, and destroying them, is vested in the king alone, and from him derived to such of his subjects as have received the grants of a chase, a park, or a free warren.

By the law of nature, indeed, every man, from the prince to the peasant, has an equal right of pursuing, and taking to his own use, all such creatures as are *fera nature*, and therefore the property of nobody, but liable to be seized by the first occupant. But it follows from the very end and constitution of society, that this natural right, as well as many others belonging to man as an individual, may be restrained by positive laws enacted for reasons of state, or for the supposed benefit of the community. This restriction may be either with respect to the *place* in which this right may, or may not, be exercised; with respect to the *animals* that are the subjects of this right; or with respect to the *persons* allowed or forbidden to exercise it. And, in consequence of this authority, we find that the municipal laws of many nations have exerted such power of restraint; have in general forbidden the entering on another man's grounds, for any cause, without the owner's leave; have extended their protection to such particular animals as are usually the

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objects of pursuit; and have invested the prerogative of hunting and taking such animals, in the sovereign of the state only, and such as he shall authorize. Many reasons have concurred for making these constitutions: as, 1. For the encouragement of agriculture and improvement of lands, by giving every man an exclusive dominion over his own soil. 2. For the preservation of the several species of these animals, which would soon be extirpated by a general liberty. 3. For prevention of idleness and dissipation in husbandmen, artificers, and others of lower rank; which would be the unavoidable consequence of universal licence. 4. For prevention of popular insurrections and resistance to the government, by disarming the bulk of the people: which last is a reason oftener meant than avowed, by the makers of forest or game laws. Nor, certainly, in these prohibitions is there any *natural* injustice, as some have weakly enough supposed: since, as Puffendorf observes, the law does not hereby take from any man his present property, or what was already his own; but barely abridges him of one means of acquiring a future property, that of occupancy; which indeed the law of nature would allow him, but of which the laws of society have in most instances very justly and reasonably deprived him.

Yet, however defensible these provisions in general may be, on the footing of reason, or justice, or civil policy, we must, notwithstanding, acknowledge, that, in their present shape, they owe their immediate original to slavery. It is not till after the irruption of the northern nations into the Roman empire, that we read of any other prohibitions, than that natural one of not sporting on any private grounds without the owner's leave.

With regard to the rise and original of our present civil prohibitions, it will be found, that all forest and game laws were introduced into Europe at the same time, and by the same policy, as gave birth to the feudal system; when those swarms of barbarians issued from their northern hive, and laid the foundation of most of the present kingdoms of Europe, on the ruins of the western empire. For when a conquering general came to settle the economy of a vanquished country, and to part it out among his soldiers or feudatories, who were to render him military service for such donations; it behoved him, in order to secure his new acquisitions, to keep the *rustici* or natives of the country, and all who were not his military tenants, in as low a condition as possible, and especially to prohibit them the use of arms. Nothing could do this more effectually than a prohibition of hunting and sporting: and therefore it was the policy of the conqueror to reserve this right to himself, and such on whom he should bestow it; which were only his capital feudatories, or greater barons. And, accordingly, we find, in the feudal constitutions, one and the same law prohibiting the *rustici* in general from carrying arms, and also proscribing the use of nets, snares, or other engines for destroying the game. This exclusive privilege well suited the martial genius of the conquering troops, who delighted in a sport which in its pursuit and slaughter bore some resemblance to war. *Vita omnis* (says Cæsar, speaking of the ancient Germans) *in venationibus atque in studiis rei militaris consistit*. And Tacitus in like manner observes, that *quoties bella non*

ineunt,

Game. *incunt, multum venatibus, plus per otium transigunt.* And indeed, like some of their modern successors, they had no other amusement to entertain their vacant hours; they despising all arts as effeminate, and having no other learning, than was couched in such rude ditties as were sung at the solemn carousals which succeeded these antient huntings. And it is remarkable, that, in those nations where the feudal policy remains the most uncorrupted, the forest or game laws continue in their highest rigour. In France, all game is properly the king's; and in some parts of Germany it is death for a peasant to be found hunting in the woods of the nobility.

With us in Britain, also, hunting has ever been esteemed a most princely diversion and exercise. The whole island was replenished with all sorts of game in the times of the Britons; who lived in a wild and pastoral manner, without inclosing or improving their grounds; and derived much of their subsistence from the chase, which they all enjoyed in common. But, when husbandry took place under the Saxon government, and lands began to be cultivated, improved, and inclosed, the beasts naturally fled into the woody and desert tracts, which were called the *forests*; and, having never been disposed of in the first distribution of lands, were therefore held to belong to the crown. These were filled with great plenty of game, which our royal sportsmen reserved for their own diversion, on pain of a pecuniary forfeiture for such as interfered with their sovereign. But every freeholder had the full liberty of sporting upon his territories, provided he abstained from the king's forests.

However, upon the Norman conquest, a new doctrine took place; and the right of pursuing and taking all beasts of chase or *venary*, and such other animals as were accounted *game*, was then held to belong to the king, or to such only as were authorized under him. And this, as well upon the principles of the feudal law, that the king is the ultimate proprietor of all the lands in the kingdom, they being all held of him as the chief lord, or lord paramount of the fee; and that therefore he has the right of the universal soil, to enter thereon, and to chase and take such creatures at his pleasure: as also upon another maxim of the common law, that these animals are *bona vacantia*, and, having no other owner, belong to the king by his prerogative. As therefore the former reason was held to vest in the king a *right* to pursue and take them any where; the latter was supposed to give the king, and such as he should authorize, a *sole* and *exclusive* right.

This right, thus newly vested in the crown, was exerted with the utmost rigour, at and after the time of the Norman establishment; not only in the ancient forests, but in the new ones which the conqueror made, by laying together vast tracts of country, depopulated for that purpose, and reserved solely for the king's royal diversion; in which were exercised the most horrid tyrannies and oppressions, under colour of forest-law, for the sake of preserving the beasts of chase; to kill any of which, within the limits of the forest, was as penal as the death of a man. And, in pursuance of the same principle, king John laid a total interdict upon the *winged* as well as the *fourfooted* crea-

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Game. tion: *capturam avium per totam Angliam interdixit* *. The cruel and unsupportable hardships which these forest-laws created to the subject, occasioned our ancestors to be as zealous for their reformation, as for the relaxation of the feudal rigours and the other exactions introduced by the Norman family; and accordingly we find the immunities of *carta de foresta* as warmly contended for, and extorted from the king with as much difficulty, as those of *magna carta* itself. By this charter, confirmed in parliament †, many forests were disafforested, or stripped of their oppressive privileges, and regulations were made in the regimen of such as remained; particularly killing the king's deer was made no longer a capital offence, but only punished by a fine, imprisonment, or abjuration of the realm. And by a variety of subsequent statutes, together with the long acquiescence of the crown without exerting the forest-laws, this prerogative is now become no longer a grievance to the subject.

But as the king reserved to himself the *forests* for his own exclusive diversion, so he granted out from time to time other tracts of lands to his subjects under the names of *chases* or *parks*; or gave them licence to make such in their own grounds; which indeed are smaller forests in the hands of a subject, but not governed by the forest-laws; and by the common law no person is at liberty to take or kill any beasts of chase, but such as hath an ancient chase or park; unless they be also beasts of prey.

As to all inferior species of game, called *beasts and fowls of warren*; the liberty of taking or killing them is another franchise or royalty, derived likewise from the crown, and called *free-warren*; a word which signifies preservation or custody: as the exclusive liberty of taking and killing fish in a public stream or river is called a *free-fishery*; of which, however, no new franchise can at present be granted, by the express provision of *magna carta*, c. 16. The principal intention of granting a man these franchises or liberties was in order to protect the game, by giving him a sole and exclusive power of killing it himself, provided he prevented other persons. And no man but he who has a chase or free-warren, by grant from the crown, or prescription, which supposes one, can justify hunting or sporting upon another man's soil; nor indeed, in thorough strictness of common law, either hunting or sporting at all.

However novel this doctrine may seem, it is a regular consequence from what has been before delivered, that the sole right of taking and destroying game belongs exclusively to the king. This appears, as well from the historical deduction here made, as because he may grant to his subjects an exclusive right of taking them; which he could not do, unless such a right was first inherent in himself. And hence it will follow, that no person whatever, but he who has such derivative right from the crown, is by common law intitled to take or kill any beasts of chase, or other game whatsoever. It is true, that, by the acquiescence of the crown, the frequent grants of free-warren in ancient times, and the introduction of new penalties of late by certain statutes for preserving the game, this exclusive prerogative of the king is little known or considered; every man that is exempted from these modern penalties, looking upon himself as at liberty to do what he

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Game.

* *M. Paris,*
303.

† 9 Hen. III.

Game.

pleases with the game: whereas the contrary is strictly true, that no man, however well *qualified* he may vulgarly be esteemed, has a right to encroach on the royal prerogative by the killing of game, unless he can show a particular grant of free-warren: or a prescription, which presumes a grant; or some authority under an act of parliament. As for the latter, there are but two instances wherein an express permission to kill game was ever given by statute; the one by 1 Jac. I. c. 27. altered by 7 Jac. I. c. 11. and virtually repealed by 22 and 23 Car. II. c. 25. which gave authority, so long as they remained in force, to the owners of free-warren, to lords of manors, and to all freeholders having 40 l. *per annum* in lands of inheritance, or 80 l. for life or lives, or 400 l. personal estate (and their servants), to take partridges and pheasants upon their own, or their master's free-warren, inheritance, or freehold: the other by 5 Ann. c. 14. which empowers lords and ladies of manors to appoint gamekeepers, to kill game for the use of such lord or lady; which with some alteration still subsists, and plainly supposes such power not to have been in them before. The truth of the matter is, that these game-laws do indeed *qualify* nobody, except in the instance of a gamekeeper, to kill game: but only to save the trouble and formal process of an action by the person injured, who perhaps too might remit the offence, these statutes inflict *additional* penalties, to be recovered either in a regular or summary way, by any of the king's subjects, from certain persons of inferior rank who may be found offending in this particular. But it does not follow that persons excused from these additional penalties are therefore *authorized* to kill game. The circumstance of having 100 l. *per annum*, and the rest, are not properly qualifications, but exemptions. And these persons, so exempted from the penalties of the game-statutes, are not only liable to actions of trespass by the owners of the land; but also, if they kill game within the limits of any royal franchise, they are liable to the actions of such who may have the right of chase or free-warren therein.

* See those articles.

Upon the whole, it appears, that the king, by his prerogative, and such persons as have, under his authority, the ROYAL FRANCHISE OF CHASE, PARK, or Free-WARREN*, are the only persons who may acquire any property, however fugitive and transitory, in these animals *feræ naturæ*, while living; which is said to be vested in them *propter privilegium*. And it must also be observed, that such persons as may thus lawfully hunt, fish, or fowl, *ratione privilegii*, have only a qualified property in these animals: it not being absolute or permanent, but lasting only so long as the creatures remain within the limits of such respective franchise or liberty, and ceasing the instant they voluntarily pass out of it. It is held indeed, that if a man starts any game within his own grounds, and follows it into another's, and kills it there, the property remains in himself. And this is grounded on reason and natural justice: for the property consists in the possession; which possession commences by the finding it in his own liberty, and is continued by the immediate pursuit. And so, if a stranger starts game in one man's chase or free-warren, and hunts it into another liberty, the property continues in the owner of the chase or warren; this property arising from privilege, and not being changed

by the act of a mere stranger. Or if a man starts game on another's private grounds, and kills it there, the property belongs to him in whose ground it was killed, because it was also started there; this property arising *ratione soli*. Whereas if, after being started there, it is killed in the grounds of a third person, the property belongs not to the owner of the first ground, because the property is local; nor yet to the owner of the second, because it was not started in his soil; but it vests in the person who started and killed it, though guilty of a trespass against both the owners. See the article *Game-Laws*.

GAME-COCK, a fighting cock, or one kept for sport; a barbarous practice, which is a disgrace to any civilized nation. See *Cock-Fighting*.

GAMELIA, in Grecian antiquity, a nuptial feast, or rather sacrifice, held in the ancient Greek families on the day before a marriage; thus called from a custom they had of shaving themselves on this occasion, and presenting their hair to some deity to whom they had particular obligations.

GAMELION, in the ancient chronology, was the eighth month of the Athenian year, containing 29 days, and answering to the latter part of our January and beginning of February. It was thus called, as being, in the opinion of the Athenians, the most proper season of the year for marriage.

GAMING, the art of playing or practising any game, particularly those of hazard; as cards, dice, tables, &c.

Gaming has at all times been looked upon as a thing of pernicious consequence to the commonwealth; and is therefore severely prohibited by law. It is considered as a practice generally intended to supply, or retrieve, the expences occasioned by LUXURY: it being a kind of tacit confession, that the company engaged therein do, in general, exceed the bounds of their respective fortunes; and therefore they cast lots to determine upon whom the ruin shall at present fall, that the rest may be saved a little longer. But, taken in any light, it is an offence of the most alarming nature; tending, by necessary consequence, to promote public idleness, theft, and debauchery, among those of a lower class; and, among persons of a superior rank, it hath frequently been attended with the sudden ruin and desolation of ancient and opulent families, an abandoned prostitution of every principle of honour and virtue, and too often hath ended in self-murder. To restrain this pernicious vice among the inferior sort of people, the statute 33 Hen. VIII. c. 9. was made; which prohibits, to all but gentlemen, the games of tennis, tables, cards, dice, bowls, and other unlawful diversions there specified, unless in the time of Christmas, under pecuniary pains and imprisonment. And the same law, and also the statute 23 Geo. II. c. 24. inflict pecuniary penalties, as well upon the master of any public house wherein servants are permitted to game, as upon the servants themselves who are found to be gaming there. But this is not the principal ground of modern complaint: it is the gaming in high life that demands the attention of the magistrate; a passion to which every valuable consideration is made a sacrifice, and which we seem to have inherited from our ancestors the ancient Germans; whom Tacitus describes to have been bewitched with the spirit of play to a most exorbitant

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Gaming.

Gaming.

bitant degree. "They addict themselves (says he) to dice (which is wonderful) when sober, and as a serious employment; with such a mad desire of winning or losing, that, when stript of every thing else, they will stake at last their liberty, and their very selves. The loser goes into a voluntary slavery; and, though younger and stronger than his antagonist, suffers himself to be bound and sold. And this perseverance in so bad a cause they call the point of honour: *ea est in re prava pervicacia, ipsi fidem vocant.*" One would almost be tempted to think Tacitus was describing a modern Englishman. When men are thus intoxicated with so frantic a spirit, laws will be of little avail: because the same false sense of honour that prompts a man to sacrifice himself, will deter him from appealing to the magistrate. Yet it is proper that laws should be, and be known publicly, that gentlemen may consider what penalties they wilfully incur, and what a confidence they repose in sharpers; who, if successful in play, are certain to be paid with honour, or, if unsuccessful, have it in their power to be still greater gainers by informing. For, by stat. 16 Car. II. c. 7. if any person by playing or betting shall lose more than 100 l. at one time, he shall not be compellable to pay the same; and the winner shall forfeit treble the value, one moiety to the king, the other to the informer. The statute 9 Ann. c. 14. enacts, that all bonds and other securities, given for money won at play, or money lent at the time to play withal, shall be utterly void: that all mortgages and incumbrances of lands, made upon the same consideration, shall be and enure to the heir of the mortgager: that, if any person at one time loses 10 l. at play, he may sue the winner, and recover it back by action of debt at law; and, in case the loser does not, any other person may sue the winner for treble the sum so lost; and the plaintiff in either case may examine the defendant himself upon oath: and that in any of these suits no privilege of parliament shall be allowed. The statute farther enacts, that if any person cheats at play, and at one time wins more than 10 l. or any valuable thing, he may be indicted thereupon, and shall forfeit five times the value, shall be deemed infamous, and suffer such corporal punishment as in case of wilful perjury. By several statutes of the reign of king George II. all private lotteries by tickets, cards, or dice (and particularly the games of faro, basset, ace of hearts, hazard, paffage, roly polly, and all other games with dice, except backgammon), are prohibited under a penalty of 200 l. for him that shall erect such lotteries, and 50 l. a-time for the players. Public lotteries, unless by authority of parliament, and all manner of ingenious devices, under the denomination of *sales* or otherwise, which in the end are equivalent to lotteries, were before prohibited by a great variety of statutes under heavy pecuniary penalties. But particular descriptions will ever be lame and deficient, unless all games of mere chance are at once prohibited; the invention of sharpers being swifter than the punishment of the law, which only hunts them from one device to another. The stat. 13 Geo. II. c. 19. to prevent the multiplicity of horse races, another fund of gaming, directs, that no plates or matches under 50 l. value shall be run, upon penalty of 200 l. to be paid by the owner of each horse running, and 100 l. by such as advertise the

plate. By statute 18 Geo. II. c. 34. the statute 9 Ann. is farther enforced, and some deficiencies supplied: the forfeitures of that act may now be recovered in a court of equity; and, moreover, if any man be convicted, upon information or indictment, of winning or losing at any sitting 10 l. or 20 l. within 24 hours, he shall forfeit five times the sum. Thus careful has the legislature been to prevent this destructive vice: which may show that our laws against gaming are not so deficient, as ourselves and our magistrates in putting those laws in execution.

Chance, or Hazard, in GAMING. Hazard, or chance, is a matter of mathematical consideration, because it admits of more and less. Gamesters either set out upon an equality of chance, or are supposed to do so. This equality may be altered in the course of the game, by the greater good-fortune or address of one of the gamesters, whereby he comes to have a better chance, so that his share in the stakes is proportionably better than at first. This more and less runs through all the ratios between equality and infinite difference, or from an infinitely little difference till it come to an infinitely great one, whereby the game is determined. The whole game, therefore, with regard to the issue of it, is a chance of the proportion the two shares bear to each other.

The probability of an event is greater or less, according to the number of chances by which it may happen, compared with the number of all the chances by which it may either happen or fail.

M. de Moivre, in a treatise *de Mensura Sortis*, has computed the variety of chances in several cases that occur in gaming, the laws of which may be understood by what follows.

Suppose p the number of cases in which an event may happen, and q the number of cases wherein it may not happen, both sides have the degree of probability, which is to each other as p to q .

If two gamesters, A and B, engage on this footing, that, if the cases p happen, A shall win; but if q happen, B shall win, and the stake be a ; the chance of

A will be $\frac{pa}{q+p}$, and that of B $\frac{qa}{p+q}$; consequently, if they sell the expectancies, they should have that for them respectively.

If A and B play with a single die, on this condition, that, if A throw two or more aces at eight throws, he shall win; otherwise B shall win; What is the ratio of their chances? Since there is but one case wherein an ace may turn up, and five wherein it may not, let $a=1$, and $b=5$. And again, since there are eight throws of the die, let $n=8$; and you will have $a+b|n-b^n-nab^{n-1}$, to b^n+nab^{n-1} : that is, the chance of A will be to that of B as 663991 to 10156525, or nearly as 2 to 3.

A and B are engaged at single quoits; and, after playing some time, A wants 4 of being up, and B 6; but B is so much the better gamester, that his chance against A upon a single throw would be as 3 to 2; What is the ratio of their chances? Since A wants 4, and B 6, the game will be ended at nine throws; therefore, raise $a+b$ to the ninth power, and it will be $a^9+9a^8b+36a^7b^2+84a^6b^3+126a^5b^4+126a^4b^5$, to $84a^3b^6+36a^2b^7+6ab^8+b^9$: call a 3, and b 2, and

3 Y 2

yo

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Gaming. you will have the ratio of chances in numbers, viz. 1759077 to 194048.

A and B play at single quoits, and A is the best gamester, so that he can give B 2 in 3: What is the ratio of their chances at a single throw? Suppose the chances as z to 1, and raise $z+1$ to its cube, which will be z^3+3z^2+3z+1 . Now since A could give B 2 out of 3, A might undertake to win three throws running; and consequently the chances in this case will be as z^3 to $3z^2+3z+1$. Hence $z^3=3z^2+3z+1$; or $2z^3=z^3+3z^2-3z+1$. And therefore $z\sqrt[3]{2}=z+1$; and, consequently, $z=\sqrt[3]{2}-1$. The chances, therefore, are $\sqrt[3]{2}-1$, and 1, respectively.

Again, suppose I have two wagers depending, in the first of which I have 3 to 2 the best of the lay, and in the second 7 to 4; What is the probability I win both wagers?

1. The probability of winning the first is $\frac{3}{5}$, that is the number of chances I have to win, divided by the number of all the chances: the probability of winning the second is $\frac{7}{11}$: therefore, multiplying these two fractions together, the product will be $\frac{21}{55}$, which is the probability of winning both wagers. Now, this fraction being subtracted from 1, the remainder is $\frac{34}{55}$, which is the probability I do not win both wagers: therefore the odds against me are 34 to 21.

2. If I would know what the probability is of winning the first, and losing the second, I argue thus: the probability of winning the first is $\frac{3}{5}$, the probability of losing the second is $\frac{4}{11}$: therefore multiplying $\frac{3}{5}$ by $\frac{4}{11}$, the product $\frac{12}{55}$ will be the probability of my winning the first, and losing the second; which being subtracted from 1, there will remain $\frac{43}{55}$, which is the probability I do not win the first, and at the same time lose the second.

3. If I would know what the probability is of winning the second, and at the same time losing the first, I say thus: The probability of winning the second is $\frac{7}{11}$; the probability of losing the first is $\frac{2}{5}$: therefore, multiplying these two fractions together, the product $\frac{14}{55}$ is the probability I win the second, and also lose the first.

4. If I would know what the probability is of losing both wagers, I say, the probability of losing the first is $\frac{2}{5}$, and the probability of losing the second $\frac{4}{11}$: therefore the probability of losing them both is $\frac{8}{55}$: which, being subtracted from 1, there remains $\frac{47}{55}$: therefore, the odds of losing both wagers is 47 to 8.

This way of reasoning is applicable to the happening or failing of any events that may fall under consideration. Thus if I would know what the probability is of missing an ace four times together with a die, this I consider as the failing of four different events. Now the probability of missing the first is $\frac{5}{6}$, the second is also $\frac{5}{6}$, the third $\frac{5}{6}$, and the fourth $\frac{5}{6}$; therefore the probability of missing it four times together is $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{625}{1296}$; which being subtracted from 1, there will remain $\frac{671}{1296}$ for the probability of throwing it once or oftener in four times: therefore the odds of throwing an ace in four times, is 671 to 625.

But if the flinging of an ace was undertaken in three times, the probability of missing it three times would

be $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{125}{216}$; which being subtracted from 1, there will remain $\frac{91}{216}$ for the probability of throwing it once or oftener in three times: therefore the odds against throwing it in three times are 125 to 91. Again, suppose we would know the probability of throwing an ace once in four times, and no more: since the probability of throwing it the first time is $\frac{1}{6}$, and of missing it the other three times, is $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6}$, it follows, that the probability of throwing it the first time, and missing it the other three successive times, is $\frac{1}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{125}{1296}$; but because it is possible to hit every throw as well as the first, it follows, that the probability of throwing it once in four throws, and missing it the other three, is $\frac{4 \times 125}{1296} = \frac{500}{1296}$; which being subtracted from 1, there will remain $\frac{796}{1296}$ for the probability of throwing it once, and no more, in four times. Therefore, if one undertake to throw an ace once, and no more, in four times, he has 500 to 796 the worst of the lay, or 5 to 8 very near.

Suppose two events are such, that one of them has twice as many chances to come up as the other; what is the probability, that the event, which has the greater number of chances to come up, does not happen twice before the other happens once, which is the case of flinging 7 with two dice before 4 once? Since the number of chances is as 2 to 1, the probability of the first happening before the second is $\frac{2}{3}$, but the probability of its happening twice before it is but $\frac{2}{3} \times \frac{2}{3}$ or $\frac{4}{9}$: therefore it is 5 to 4 seven does not come up twice before four once.

But, if it were demanded, what must be the proportion of the facilities of the coming up of two events, to make that which has the most chances come up twice, before the other comes up once? The answer is, 12 to 5 very nearly: whence it follows, that the probability of throwing the first before the second is $\frac{12}{17}$, and the probability of throwing it twice is $\frac{12}{17} \times \frac{12}{17}$, or $\frac{144}{289}$; therefore the probability of not doing it is $\frac{145}{289}$: therefore the odds against it are as 145 to 144, which comes very near an equality.

Suppose there is a heap of thirteen cards of one colour, and another heap of thirteen cards of another colour; What is the probability, that, taking one card at a venture out of each heap, I shall take out the two aces?

The probability of taking the ace out of the first heap is $\frac{1}{13}$, the probability of taking the ace out of the second heap is $\frac{1}{13}$; therefore the probability of taking out both aces is $\frac{1}{13} \times \frac{1}{13} = \frac{1}{169}$, which being subtracted from 1, there will remain $\frac{168}{169}$: therefore the odds against me are 168 to 1.

In cases where the events depend on one another, the manner of arguing is somewhat altered. Thus, suppose that out of one single heap of thirteen cards of one colour I should undertake to take out first the ace; and, secondly, the two: though the probability of taking out the ace be $\frac{1}{13}$, and the probability of taking out the two be likewise $\frac{1}{13}$: yet, the ace being supposed as taken out already, there will remain only twelve cards in the heap, which will make the probability of taking out the two to be $\frac{1}{12}$; therefore the probability of taking out the ace, and then the two, will be $\frac{1}{13} \times \frac{1}{12}$.

In this last question the two events have a dependence on each other; which consists in this, that one of the events

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Gaming
||
Ganges.

Ganglion
||
Gaol.

events being supposed as having happened, the probability of the other's happening is thereby altered. But the case is not so in the two heaps of cards.

If the events in question be n in number, and be such as have the same number a of chances by which they may happen, and likewise the same number b of chances by which they may fail, raise $a+b$ to the power n . And if A and B play together, on condition that if either one or more of the events in question happen, A shall win, and B lose, the probability of A's winning will be $\frac{a+b|^n - b^n}{a+b|^n}$; and that of B's win-

ning will be $\frac{b^n}{a+b|^n}$; for when $a+b$ is actually raised to the power n , the only term in which a does not occur is the last b^n : therefore all the terms but the last are favourable to A.

Thus if $n=3$, raising $a+b$ to the cube $a^3+3a^2b+3ab^2+b^3$, all the terms but b^3 will be favourable to A; and therefore the probability of A's winning will be $\frac{a^3+3a^2b+3ab^2}{a+b|^3}$, or $\frac{a+b|^3 - b^3}{a+b|^3}$; and the probability of B's winning will be $\frac{b^3}{a+b|^3}$. But if A and B

play on condition, that if either two or more of the events in question happen, A shall win; but in case one only happen, or none, B shall win; the probability of A's winning will be $\frac{a+b|^n - nab^n - b^n}{n+b|^n}$; for

the only two terms in which aa does not occur, are the two last, viz. $nab^n - b^n$ and b^n .

GAMMONING, among seamen, denotes several turns of a rope taken round the bowsprit, and reeved through holes in knees of the head, for the greater security of the bowsprit.

GAMMUT, GAMUT, *GAM-ut*, in music, a scale whereon we may learn to sound the musical notes, *ut*, *re*, *mi*, *fa*, *sol*, *la*, in their several orders and dispositions. See MUSIC.

The invention of this scale is owing to Guido Aretin, monk of Arezzo, in Tuscany, about the year 1009; though it is not so properly an invention, as an improvement on the diagram or scale of the ancients. See ARETIN.

Several alterations have been made in the gammut. M. le Maire, particularly, has added a seventh note; viz. *fi*; and the English usually throw out both *ut* and *fi*, and make the other five serve for all.

GANDER, in ornithology, the male of the goose-kind; one of which, it is said, will serve five geese. See ANAS.

GANG-WAY, is the several passages or ways from one part of the ship to the other; and whatsoever is laid in any of those passages, is said to lie in the gang-way.

GAGANELLI. See CLEMENT XIV.

GANGES, a large and celebrated river of India. It has its source in the mountains which border on Little Thibet, in 96 degrees of longitude, and 35.45. of latitude. It crosses several kingdoms, running from north to south; and falls into the bay of Bengal, by several mouths. The waters are lowest in April and May, and highest before the end of September. It

overflows yearly like the Nile; and renders the kingdom of Bengal as fruitful as that of the Delta in Egypt. The people in these parts hold the water of this river in high veneration; and it is visited annually by a prodigious number of pilgrims from all parts of India. The English have several settlements on this river, which will be taken notice of in their proper places. The greatest happiness that many of the Indians wish for, is to die in this river.

GANGLION, in anatomy, denotes a knot frequently found in the course of the nerves, and which is not morbid; for wherever any nerve sends out a branch, or receives one from another, or where two nerves join together, there is generally a ganglion or plexus, as may be seen at the beginning of all the nerves of the medulla spinalis, and in many other places of the body.

GANGLION, in surgery, a hard tubercle, generally moveable, in the external or internal part of the carpus, upon the tendons or ligaments in that part; usually without any pain to the patient.

GANGRENE, a very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt, and put on a state of putrefaction. See MEDICINE, and SURGERY.

GANNET, or *SOLAND Goose*, in ornithology. See PELICANUS.

GANTLET, or GAUNTLET, a large kind of glove made of iron, and the fingers covered with small plates. It was formerly worn by the cavaliers, when armed at all points. The word is derived of the French *ganteler*; and that from *gant* or *gant*, "glove."

The casque and gauntlets were always borne in the ancient marches in ceremony. Gauntlets were not introduced till about the 13th century.

The gauntlet was frequently thrown like the glove, by way of challenge.

GANTLOPE. See GAUNTLOPE.

GANYMEDE, in mythology, a beautiful youth of Phrygia, son of Tros and brother to Ilus; according to Lucian, he was the son of Dardanus. Jupiter was charmed with him; and carrying him away, made him his cup-bearer in the room of Hebe. Some say that he caused him to be carried away by an eagle, and others affirm he was himself the ravisher under the form of that bird. He deified this youth; and to comfort his father, made a present to him of some of those very swift horses that the gods rode upon.

GAOL (*Gaola*, Fr. *Geole*, i. e. *Caveola*, "a cage for birds"), is used metaphorically for a prison. It is a strong place or house for keeping of debtors, &c. and wherein a man is restrained of his liberty to answer an offence done against the laws: and every county hath two gaols, one for debtors, which may be any house where the sheriff pleases; the other for the peace and matters of the crown, which is the county gaol.

If a gaol be out of repair, or insufficient, &c. justices of peace, in their quarter sessions, may contract with workmen for the rebuilding or repairing it; and by their warrant order the sum agreed on for that purpose to be levied on the several hundreds, and other divisions in the county by a just rate, 11 & 12. Wil. III. c. 19. See PRISON.

GAOL-Delivery. The administration of justice being originally in the crown, in former times our kings

Gaoler || in person rode through the realm once in seven years, to judge of and determine crimes and offences; afterwards justices in eyre were appointed; and since, justices of assize and gaol-delivery, &c. A commission of gaol-delivery, is a patent in nature of a letter from the king to certain persons, appointing them his justices, or two or three of them, and authorising them to deliver his gaol, at such a place, of the prisoners in it: for which purpose it commands them to meet at such a place, at the time they themselves shall appoint; and informs them, that, for the same purpose, the king hath commanded his sheriff of the same county to bring all the prisoners of the gaol, and their attachments, before them at the day appointed.

The justices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, trespass, &c. and to order to execution or reprieve: they may likewise discharge such prisoners, as on their trials are acquitted, and those against whom, on proclamation being made, no evidence has appeared: they have authority to try offenders for treason, and to punish many particular offences, by statute 2 *Hawk.* 24. 2 *Hale's hist. Placit. Cor.* 35.

GAOLER, the keeper of a gaol or prison. Sheriffs are to make such gaolers for whom they will be answerable: but if there be any default in the gaoler, an action lies against him for an escape, &c. yet the sheriff is most usually charged; 2 *Inst.* 592. Where a gaoler kills a prisoner by hard usage, it is felony; 3 *Inst.* 52. No fee shall be taken by gaolers, but what is allowed by law, and settled by the judges, who may determine petitions against their extortions, &c. 2 *Geo.* II. c. 22.

GAONS, a certain order of Jewish doctors, who appeared in the East, after the closing of the talmud. The word *Gaons* signifies "excellent, sublime;" as in the divinity-schools we formerly had Irrefragable, Sublime, Resolute, Angelic, and Subtile doctors. The Gaons succeeded the Seburæans or Opiners, about the beginning of the sixth century. Chanan Meisichtia was the head, and first of the excellents. He restored the academy of Pandebita, which had been shut up for 30 years.

GAR-FISH, *Horn-fish*, or *Sea-needle*. See *ESOX*.

GARAMA (anc. geog.), the capital of the Garamantes in Libya Interior; near the springs of the Cinyphus, now in ruins. Garamantes the people. It lay to the south of the Gætulia, extending from the springs of the Cinyphus, and the adjacency of the river Gir, to the mountains which form at the *Vallis Garamantica* (Pliny); or from the springs of the Bagradas to the lake Nuba (Ptolemy).

GARAMOND (Claude), a very ingenious letter-founder, was born at Paris; where he began, in the year 1510, to found his printing types free from all the remains of the Gothic, or (as it is generally called) the *black letter*, and brought them to such perfection, that he had the glory of surpassing all who went before him, and of being scarcely ever excelled by his successors in that useful art. His types were prodigiously multiplied; both by the great number of matrices he struck, and the types formed in resemblance of his in all parts of Europe. Thus in Italy, Germany, England, and Holland, the booksellers, by way of recommending their books, distinguished the type by

his name; and in particular the small Roman was by way of excellence known among the printers of these nations by the name of *Garamond's small Roman*. By the special command of king Francis I. he founded three sizes of Greek types for the use of Robert Stephens, who with them printed all his beautiful editions of the New Testament, and other Greek authors. He died at Paris in 1561.

GARASSE (Francis), a remarkable jesuitical writer, the first author of that irreconcilable enmity that still subsists between the Jesuits and Jansemits in the church of Rome, was born at Angoulême in 1585: and entered the Jesuits college in 1600. As he had a quick imagination, a strong voice, and a peculiar turn to wit, he became a popular preacher in the chief cities of France; but not content with this honour, he distinguished himself still more by his writings, which were bold, licentious, and produced much controversy. The most considerable in its consequences was intitled *La somme theologique des veritez capitales de la religion Chretienne*; which was first attacked by the abbot of St Cyran, who observing in it a prodigious number of falsifications of the scriptures and of the fathers, besides many heretical and impious opinions, conceived the honour of the church required him to undertake a refutation. Accordingly he published a full answer to it; while Garasse's book was also under examination of the doctors of the Sorbonne, by whom it was afterwards condemned. Garasse replied to St Cyran; but the two parties of Jesuits and Jansemits, of whom these were respectively the champions, grew to an implacable animosity against each other, that is not even now likely to subside. The Jesuits were forced to remove their brother to a distance from Paris; where, probably weary of his inactive obscurity, when the plague raged at Poitiers in 1631, he begged leave of his superior to attend the sick, in which charitable office he caught the disorder, and died.

GARBE, in heraldry, a sheaf of any kind of grain, borne in several coats of arms, and said to represent summer, as a bunch of grapes does autumn.

GARBLE, a word used to signify the action of separating the dross and dust from spice, drugs, &c. *Garbling* is the cleansing and purifying the good from the bad; and may come from the Italian *garbo*, i. e. finery or neatness: and hence, probably, we say, when we see a man in a neat habit, that he is in handsome *garb*.

GARCILASSO (de la Vega), a celebrated Spanish poet, born of a noble family at Toledo in 1500. He was educated near the emperor Charles V. who had a particular regard for him, and whom he attended in all his military expeditions; acquiring as much renown by his courage as by his poetry. In Provence he commanded a battalion; and was killed in the 36th year of his age, by a stone thrown at his head by a country man from a turret. He had strong natural talents for poetry; and not only extended the bounds, but introduced new beauties, into that of the Spanish language. —We must not confound this poet with another person of the same name, a native of Cusco, who wrote in Spanish a History of Florida, and of Peru and the Incas.

GARCINIA, in botany: A genus of the monogynia order, belonging to the dodecandria class of plants;

Garasse ||
Garcinia. ||

Garcinia plants; and in the natural method ranking under the 18th order, *Bicornes*. The calyx is tetraphyllous inferior; there are four petals; the berry is octospermous; and crowned with a shield-like stigma. There is but one species, the mangostana, a tree of great elegance, and producing the most pleasant fruit of any yet known. See Plate CCVI.

* In honour of whom, as its most accurate describer, Linnæus gave it the name *Garcinia*.

This tree has been very accurately described by Dr Garcin*, in the 35th volume of the Philosophical Transactions. It grows, he informs us, to about 17 or 18 feet high, "with a straight taper stem like a fir," having a regular tuft in form of an oblong cone, composed of many branches and twigs, spreading out equally on all sides, without leaving any hollow. Its leaves, he observes, are oblong, pointed at both ends, entire, smooth, of a shining green on the upper side, and of an olive on the back. Its flower is composed of four petals, almost round, or a little pointed: their colour resembles that of a rose, only deeper and less lively. The calyx of this flower is of one piece, expanded, and cut into four lobes. The two upper lobes are something larger than the lower ones; they are greenish on the outside, and of a fine deep red within: the red of the upper ones is more lively than that of the lower ones. This calyx incloses all the parts of the flower; it is supported by a pedicle, which is green, and constantly comes out of the end of a twig above the last pair of leaves. The fruit is round, of the size of a small orange, from an inch and an half to two inches diameter. The body of this fruit is a capsula of one cavity, composed of a thick rind a little like that of a pomegranate, but softer, thicker, and fuller of juice. Its thickness is commonly of a quarter of an inch. Its outer colour is of a dark brown purple, mixed with a little grey and dark green. The inside of the peel is of a rose colour, and its juice is purple. Last of all, this skin is of a styptic or astringent taste, like that of a pomegranate, nor does it stick to the fruit it contains. The inside of this fruit is a furrowed globe, divided into segments, much like those of an orange, but unequal in size, which do not adhere to each other. The number of these segments is always equal to that of the rays of the top which covers the fruit. The fewer there are of these segments, the bigger they are. There are often in the same fruit segments as big again as any of those that are on the side of them. These segments are white, a little transparent, fleshy, membranous, full of juice like cherries or raspberries; of a taste of strawberries and grapes together. Each of the segments incloses a seed of the figure and size of an almond stripped of its shell, having a protuberance on one of its sides. These seeds are covered with two small skins, the outermost of which serves for a basis to the filaments and membranes of which the pulp is composed. The substance of these seeds comes very near to that of chestnuts, as to their consistency, colour, and astringent quality.

"This tree (according to our author) originally grows in the Molucca islands, where it is called *mangostan*; but has been transplanted from thence to the island of Java and Malacca, at which last place it thrives very well. Its tuft is so fine, so regular, so equal, and the appearance of its leaves so beautiful, that it is at present looked upon at Batavia as the most proper for adorning a garden, and affording an agreeable shade.

There are few seeds, however (he observes), to be met with in this fruit that are good for planting, most part of them being abortive."—He concludes his description by mentioning, that one may eat a great deal of this fruit without any inconvenience; and that it is the only one which sick people may be allowed to eat without any scruple.

Other writers concur in their praises of this fruit. Rumphius observes, that the mangostan is universally acknowledged to be the best and wholesomest fruit that grows in India; that its flesh is juicy, white, almost transparent, and of as delicate and agreeable a flavour as the richest grapes: the taste and smell being so grateful, that it is scarce possible to be cloyed with eating it.—He adds, that when sick people have no relish for any other food, they generally eat this with great delight; but should they refuse it, their recovery is no longer expected. "It is remarkable (says he) that the mangostan is given with safety in almost every disorder. The dried bark is used with success in the dysentery and tenesmus; and an infusion of it is esteemed a good gargle for a sore mouth or ulcers in the throat. The Chinese dyers use this bark for the ground or basis of a black colour, in order to fix it the firmer."

According to Captain Cook, in his Voyage round the World, vol. iii. p. 737, the *garcinia mangostana* of Linnæus is peculiar to the East Indies. It is about the size of the crab-apple, and of a deep red-wine colour. On the top of it is the figure of five or six small triangles joined in a circle; and at the bottom several hollow green leaves, which are remains of the blossom. When they are to be eaten, the skin, or rather flesh, must be taken off; under which are found six or seven white kernels, placed in a circular order; and the pulp with which these are enveloped is the fruit, than which nothing can be more delicious. It is a happy mixture of the tart and the sweet, which is no less wholesome than pleasant; and, as well as the sweet orange, is allowed in any quantity to those who are afflicted with fevers either of the putrid or inflammatory kind.

GARCON, or GARSOON, a French term, literally signifying a boy or male child any time before his marriage.—It is also applied to divers inferior officers, among us called *grooms*, *garçones*. Thus all the servants in the French king's chambers, wardrobe, &c. who do the lesser offices thereof under the proper officers, are called *garçons de la chambre, de la garde-robe*, &c.

GARDANT, or GUARDANT, in heraldry, denotes any beast full-faced, and looking right forward.

GARDEN, a piece of ground properly laid out, cultivated, and ornamented with a variety of plants, flowers, fruits, &c. See GARDENING.

Gardens are usually distinguished into flower-garden, fruit-garden, and kitchen-garden: the first of which, being designed for pleasure and ornament, is to be placed in the most conspicuous part, that is, next to the back-front of the house; and the two latter, being designed for use, should be placed less in sight. But though the fruit and kitchen gardens are here mentioned as two distinct gardens, yet they are now usually in one; and that with good reason, since they both require a good soil and exposure, and equally require to be placed out of the view of the house. See KITCHEN-Garden.

In the choice of a place proper for a garden, the most

Garcinia
||
Garden.

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most essential points to be considered are, the situation, the soil, the exposure, water, and prospect.

1st, As to the situation, it ought to be such a one as is wholesome, and in a place neither too high nor too low; for if a garden be too high, it will be exposed to the winds, which are very prejudicial to trees; and if it be too low, the dampness, the vermin, and the venomous-creatures that breed in ponds and marshy places, add much to their insalubrity. The most happy situation is on the side of a hill, especially if the slope be easy, and in a manner imperceptible; if a good deal of level ground be near the house; and if it abounds with springs of water: for, being sheltered from the fury of the winds, and the violent heat of the sun, a temperate air will be there enjoyed; and the water that descends from the top of the hill, either from springs or rain, will not only supply fountains, canals, and cascades for ornament, but, when it has performed its office, will water the adjacent valleys, and, if it be not suffered to stagnate, will render them fertile and wholesome.

2dly, A good earth or soil is next to be considered; for it is scarce possible to make a fine garden in a bad soil. There are indeed ways to meliorate ground, but they are very expensive; and sometimes, when the expence has been bestowed of laying good earth three feet deep over the whole surface, a whole garden has been ruined, when the roots of the trees have come to reach the natural bottom. To judge of the quality of the soil, observe whether there be any heath, thistles, or such like weeds, growing spontaneously in it; for they are certain signs that the ground is poor. Or if there be large trees growing thereabouts, observe whether they grow crooked, ill-shaped, and grubby; and whether they are of a faded green, and full of moss, or infested with vermin: if this be the case, the place is to be rejected. But, on the contrary, if it be covered with good grass fit for pasture, you may then be encouraged to try the depth of the soil. To know this, dig holes in several places, six feet wide and four deep; and if you find three feet of good earth it will do very well, but less than two will not be sufficient. The quality of good ground is, neither to be stony nor too hard to work; neither too dry, too moist, nor too sandy and light; nor too strong and clayey, which is the worst of all for gardens.

3dly, The next requisite is water; the want of which is one of the greatest inconveniences that can attend a garden, and will bring a certain mortality upon whatever is planted in it, especially in the greater droughts that often happen in a hot and dry situation in summer; besides its usefulness in fine gardens for making fountains, canals, cascades, &c. which are the greatest ornaments of a garden.

4thly, The last thing to be considered is the prospect of a fine country; and though this is not so absolutely necessary as water, yet it is one of the most agreeable beauties of a fine garden: besides, if a garden be planted in a low place that has no kind of prospect, it will not only be disagreeable, but unwholesome.

In the laying out and planting of gardens, the beauties of nature should always be studied; for the nearer a garden approaches to nature, the longer it will please. According to Mr Miller, the area of a handsome garden may take up 30 or 40 acres, but not more; and

N^o 134.

the following rules should be observed in the disposition of it. There ought always to be a descent of at least three steps from the house to the garden; this will render the house more dry and wholesome, and the prospect on entering the garden more extensive. The first thing that ought to present itself to view should be an open lawn of grass, which ought to be considerably broader than the front of the building; and if the depth be one-half more than the width, it will have a better effect: if on the sides of the lawn there are trees planted irregularly, by way of open groves, the regularity of the lawn will be broken, and the whole rendered more like nature. For the convenience of walking in damp weather, this lawn should be surrounded with a gravel-walk, on the outside of which should be borders three or four feet wide for flowers: and from the back of these the prospect will be agreeably terminated by a slope of ever-green shrubs; which, however, should never be suffered to exclude agreeable prospects, or the view of handsome buildings. These walks may lead through the different plantations, gently winding about in an easy natural manner; which will be more agreeable than either those long straight walks, too frequently seen in gardens, or those serpentine windings that are twisted about into so many short turns as to render it difficult to walk in them; and as no garden can be pleasing where there is a want of shade and shelter, these walks should lead as soon as possible into plantations, where persons may walk in private, and be sheltered from the wind.

Narrow rivulets, if they have a constant stream, and are judiciously led about a garden, have a better effect than many of the large stagnating ponds or canals so frequently made in large gardens. When wildernesses are intended, they should not be cut into stars and other ridiculous figures, nor formed into mazes or labyrinths, which in a great design appear trifling.

In short, the several parts of a garden should be diversified; but in places where the eye takes in the whole at once, the two sides should be always the same. In the business of designs, the aim should be always at what is natural, great, and noble. The general disposition of a garden and of its parts ought to be accommodated to the different situations of the ground, to humour its inequalities, to proportion the number and sorts of trees and shrubs to each part, and to shut out from the view of the garden no objects that may become ornamental. But for a more extended view of this subject, see the article GARDENING.

A practical attention to a garden, is by some esteemed a degrading employment. It is true, indeed, that pastoral and agricultural manners, if we may form a judgment from the dignified descriptions of Virgil, are greatly degenerated. The employments of shepherds and husbandmen are now become mean and sordid. The work of the garden is usually left to a peasant. Nor is it unreasonable to assign the labour, which wears without amusement, to those who are sufficiently amused by the prospect of their wages. But the operations of grafting, of inoculating, of pruning, of transplanting, are curious experiments in natural philosophy; and that they are pleasing as well as curious, those can testify who remember what they felt on seeing their attempts in the amusement of practical gardening attended with success. Among the

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Garden. employments suitable to old age, Cicero has enumerated the superintendence of a garden. It requires no great exertion of mind or body; and its satisfactions are of that kind which please without violent agitation. Its beneficial influence on health is an additional reason for an attention to it at an age when infirmities abound.

In almost every description of the seats of the blessed, ideas of a garden seem to have predominated. The word Paradise itself is synonymous with garden. The fields of Elysium, that sweet region of poetry, are adorned with all that imagination can conceive to be delightful. Some of the most pleasing passages of Milton, are those in which he represents the happy pair engaged in cultivating their blissful abode. Poets have always been delighted with the beauties of a garden. Lucan is represented by Juvenal as reposing in his garden. Virgil's Georgics prove him to have been captivated with rural scenes; though, to the surprise of his readers, he has not assigned a book to the subject of a garden. Our Shenstone made it his study; but, with all his taste and fondness for it, he was not happy in it. The captivating scenes which he created at the Leasowes, afforded him, it is said, little pleasure in the absence of spectators. The truth is, he made the embellishment of his grounds, which should have been the amusement of his life, the business of it; and involved himself in such troubles, by the expences it occasioned, as necessarily excluded tranquil enjoyment.

It is the lot of few, in comparison, to possess territories like his, extensive, and sufficiently well-adapted to constitute an ornamented farm. Still fewer are capable of supporting the expence of preserving it in good condition. But let not the rich suppose they have appropriated the pleasures of a garden. The possessor of an acre, or a smaller portion, may receive a real pleasure, from observing the progress of vegetation, even in a plantation of culinary plants. A very limited tract, properly attended to, will furnish ample employment for an individual. Nor let it be thought a mean care; for the same hand that raised the cedar, formed the hyssop on the wall. Even the orchard, cultivated solely for advantage, exhibits beauties unequalled in the shrubbery; nor can the green-house produce an appearance to exceed the blossom of the apple and the almond.

Hanging GARDENS, in antiquity, gardens raised on arches by Nebuchadnezzar king of Babylon, in order to gratify his wife Amyctis, daughter of Astyages king of Media. Q. Curtius makes them equal in height to the walls of the city, viz. 50 feet. They contained a square of 400 feet on every side, and were carried up into the air in several terraces laid above one another, and the ascent from terrace to terrace was by stairs 10 feet wide. The arches sustaining the whole pile were raised above one another, and it was strengthened by a wall, surrounding it on every side, of 22 feet in thickness. The floors of each of the terraces were laid in the following manner: on the top of the arches were first laid large flat stones 16 feet

long and 4 broad, and over them was a layer of reed mixed with a great quantity of bitumen, over which were two rows of bricks closely cemented together by plaster, and over all were laid thick sheets of lead; and lastly, upon the lead was laid the mould of the garden. The mould or earth was of such a depth as to admit the largest trees to take root and grow; and it was covered with various kinds of trees, plants, and flowers. In the upper terrace there was an aqueduct or engine, whereby water was drawn up out of the river for watering the whole garden.

Floating GARDENS. We are informed by the abbé Clavigero in his History of Mexico, that when the Mexicans were brought under subjection to the Colhuan and Tepanecan nations, and confined to the miserable little islands on the lake of Mexico, they ceased for some years to cultivate the land, because they had none, until necessity and industry together taught them to form moveable fields and gardens, which floated on the waters of the lake. The method which they pursued to make those, and which they still practise, is extremely simple. They plait and twist willows and roots of marsh plants or other materials together, which are light, but capable of supporting the earth of the garden firmly united. Upon this foundation they lay the light bushes which float on the lake; and over all, the mud and dirt which they draw up from the bottom of the same lake. Their regular figure is quadrangular; their length and breadth various; but generally they are about eight perches long, and not more than three in breadth, and have less than a foot of elevation above the surface of the water. These were the first fields which the Mexicans owned after the foundation of Mexico; there they first cultivated the maize, great pepper, and other plants necessary for their support. In progress of time, as those fields grew numerous from the industry of the people, there were among them gardens of flowers and odoriferous plants, which were employed in the worship of their gods, and served for the recreation of the nobles. At present they cultivate flowers and every sort of garden herbs upon them. Every day of the year, at sun-rise, innumerable vessels loaded with various kinds of flowers and herbs, which are cultivated in those gardens, are seen arriving by the canal, at the great market-place of that capital. All plants thrive there surprisingly; the mud of the lake is an extremely fertile soil, and requires no water from the clouds. In the largest gardens there is commonly a little tree, and even a little hut to shelter the cultivator and defend him from rain or the sun. When the owner of a garden, or the *Chinampa* as he is usually called, wishes to change his situation, to remove from a disagreeable neighbour, or to come nearer to his own family, he gets into his little vessel, and by his own strength alone if the garden is small, or with the assistance of others if it is large, he tows it after him, and conducts it wherever he pleases with the little tree and hut upon it. That part of the lake where those floating gardens are, is a place of infinite recreation, where the senses receive the highest possible gratification.

Garden.

G A R D E N I N G;

THE art of planning and cultivating gardens. In its utmost extent, whatever contributes to render the scenes of nature delightful, is amongst the subjects of gardening; and animate as well as inanimate objects are circumstances of beauty or character. The whole range of nature is open to the gardener, from the parterre to the forest; and whatever is agreeable to the senses or the imagination, he may appropriate to the spot he is to improve: it is a part of his business to collect into one place the delights which are generally dispersed through different species of country.

History of Gardening.

Hist. of Mod. Gardening, subjoined to the 4th vol. of his Anecdotes of Painting.

GARDENING, Mr Walpole* observes, was probably one of the first arts that succeeded to that of building houses, and naturally attended property and individual possession. Culinary, and afterwards medicinal herbs, were the objects of every head of a family: it became convenient to have them within reach, without seeking them at random in woods, in meadows, and on mountains, as often as they were wanted. When the earth ceased to furnish spontaneously all those primitive luxuries, and culture became requisite, separate inclosures for rearing herbs grew expedient. Fruits were in the same predicament; and those most in use or that demand attention must have entered into and extended the domestic inclosure. The good man Noah, we are told, planted a vineyard, drank of the wine, and was drunken; and every body knows the consequences. Thus we acquired kitchen-gardens, orchards, and vineyards. No doubt the prototype of all these sorts was the garden of Eden; but as that Paradise was a good deal larger than any we read of afterwards, being inclosed by the rivers Pison, Gihon, Hiddekel, and Euphrates; as every tree that was pleasant to the sight and good for food grew in it; and as two other trees were likewise found there, of which not a slip or sucker remains; it does not belong to the present discussion. After the Fall, no man living was suffered to enter into the garden; and the poverty and necessities of our first ancestors hardly allowed them time to make improvements in their estates in imitation of it, supposing any plan had been preserved. A cottage and a slip of ground for a cabbage and a gooseberry-bush, such as we see by the side of a common, were in all probability the earliest seats and gardens: a well and bucket succeeded to the Pison and Euphrates. As settlements increased, the orchard and the vineyard followed; and the earliest princes of tribes possessed just the necessities of a modern farmer.

Matters, we may well believe, remained long in this situation; and we have reason to think that for many centuries the term *garden* implied no more than a kitchen-garden or orchard.

The garden of Alcinoüs, in the *Odyssey*, is the most renowned in the heroic times. Is there an admirer of Homer who can read his description without rapture? or who does not form to his imagination a scene of delights more picturesque than the landscapes of Tinian

or Juan Fernandez? "Yet (continues our author) what was that boasted Paradise with which

the gods ordain'd
To grace Alcinoüs and his happy land?

Why, divested of harmonious Greek and bewitching poetry, it was a small orchard and vineyard, with some beds of herbs and two fountains that watered them, inclosed within a quick-set hedge. The whole compass of this pompous garden inclosed—four acres:

Four acres was th' allotted space of ground,
Fenc'd with a green inclosure all around.

The trees were apples, figs, pomegranates, pears, olives, and vines.

Tall thriving trees confess'd the fruitful mold;
The red'ning apple ripens into gold.
Here the blue fig with luscious juice o'erflows,
With deeper red the full pomegranate glows.
The branch here bends beneath the weighty pear,
And verdant olives flourish round the year.

* * * * *

Beds of all various herbs, for ever green,
In beauteous order terminate the scene.

Alcinoüs's garden was planted by the poet, enriched by him with the fairy gift of eternal summer, and no doubt an effort of imagination surpassing any thing he had ever seen. As he has bestowed on the same happy prince a palace with brazen walls and columns of silver, he certainly intended that the gardens should be proportionably magnificent. We are sure, therefore, that, as late as Homer's age, an inclosure of four acres, comprehending orchard, vineyard, and kitchen-garden, was a stretch of luxury the world at that time had never beheld."

Previous to this, however, we have in the sacred writings hints of a garden still more luxuriously furnished. We allude to the Song of Solomon, part of the scene of which is undoubtedly laid in a garden †. Flowers and fruits are particularly spoken of as the ornaments and the produce of it; and besides these, aromatic vegetables formed a considerable part of the gratifications it afforded. The camphor and the cinnamon tree, with all trees of frankincense, and all the chief spices, flourished there ‡. Solomon tells us in another place ||, That he made him great works;—gardens 12. and orchards, and planted in them trees of every kind. || Eccl. ii. Indeed we must suppose his gardens to have been both 4. 5. amply and curiously furnished, seeing the kinds, nature, and properties of the vegetable tribes, seem to have been a favourite study with the royal philosopher; and to have been deemed a subject worthy of his pen: for we are told, that he wrote of plants, from the great cedar of Lebanon down to the hyssop of the wall §. Fountains and streams of water appear also to have had a share in the composition, and probably for ornament as well as use. § Kings iv. 33.

The hanging gardens of Babylon, mentioned in a preceding article, were a still greater prodigy. But as they are supposed to have been formed on terraces and the walls of the palace, whither soil was conveyed on purpose, Mr Walpole concludes, "they were what sumptuous.

tuous gardens have been in all ages till the present, unnatural, enriched by art, possibly with fountains, statues, ballustrades, and summer-houses, and were any thing but verdant and rural."

Others, however, have allowed them greater praise. They seem, in many respects, to have been laid out with good taste. Their elevation not only produced a variety and extent of view, but was also useful in moderating the heat. Such a situation would likewise fruit a greater variety of trees and plants than a plain surface, and would contain a larger as well as a more diversified extent.

The suiting of the situation to the nature of the trees seems, from the account given by Josephus, to have been one view* in the erecting the building in such a manner. And the success seems to have been answerable, as the trees are said to have flourished extremely well †, and to have grown as tall as in their native situations. On the whole, then, however different these may appear from modern gardens, they seem to have been formed with judgment and taste, and well adapted to the situation and circumstances.

It seems probable, from several circumstances, that the eastern gardens were adjoining to the house or palace to which they belonged. Thus, king Ahasuerus goes immediately from the banquet of wine to walk in the garden of the palace ‡. The garden of Cyrus, at Sardis, mentioned by Xenophon §, was probably contiguous to the palace; as was that of Attalus, mentioned by Justin ¶. The hanging gardens at Babylon, were not so much adjacent to the palace, as a part of the palace itself, since several of the royal apartments were beneath them ¶.

It is not clear what the taste for gardening was among the Greeks. The Academus, we know, was a wooded shady place; and the trees appear to have been of the olive species. It was situated beyond the limits of the walls, and adjacent to the tombs of the heroes; and though we are nowhere informed of the particular manner in which this grove was disposed or laid out, it may be gathered from Pausanias, in his Attica, that it was an elegant ornamented place. At the entrance was an altar dedicated to Love, which was said to be the first erected to that Deity. Within the Academus, were the altars of Prometheus, of the Muses, of Mercury, of Minerva, and Hercules; and at a small distance was the tomb of Plato. So that, in all probability, it was highly adapted by art, as well as nature, to philosophic reflection and contemplation.

We are told by Plutarch, that before the time of Cimon, the Academus was a rude and uncultivated spot: but that it was planted by that general, and had water conveyed to it; whether this water was brought merely for use to refresh the trees, or for ornament, does not appear. It was divided into gymnasia, or places of exercise, and philosophic walks, shaded with trees. These are said to have flourished very well, until destroyed by Sylla (when he besieged Athens), as well as those in the Lyceum.

Near the academy were the gardens of the philosophers, of Plato and of Epicurus; which, however, were probably but small. The scene of Plato's Dialogue concerning Beauty is elegantly described as being on the banks of the river Ilissus, and under the shade of the plantane; but no artificial arrangement

of objects is mentioned, nor any thing which will lead us to imagine the prospect to be any other than merely natural.

Among the Romans, a taste for gardening, any otherwise than as a matter of utility, seems not to have prevailed till a very late period; at least the writers on husbandry, Cato, Varro, Columella, and Palladius, make not the least mention of a garden as an object of pleasure, but solely with respect to its productions of herbs and fruits. The Lucullan gardens are the first we find mentioned of, remarkable magnificence; though probably from the extravagance to which these were arrived, they were not the first. Plutarch speaks of them as incredibly expensive, and equal to the magnificence of kings. They contained artificial elevations of ground to a surprising height, of buildings projected into the sea, and vast pieces of water made upon land. In short, his extravagance and expence were so great, that he acquired thence the appellation of the Roman Xerxes. It is not improbable, from the above account, and from the consideration of Lucullus having spent much time in Asia, in a situation wherein he had an opportunity of observing the most splendid constructions of this kind, that these gardens might be laid out in the Asiatic style. The vast masses of building said to have been erected, might have borne some resemblance, in the arrangement and style, to the Babylonian gardens; and the epithet of the Roman Xerxes might be applicable to the taste, as well as to the size and expence of his works.

The Tusculan Villa of Cicero, though often mentioned, is not any where described in his works, so as to give an adequate idea of the style in which his gardens or grounds were disposed.

There is but little to be traced in Virgil relative to this subject. Pines*, it seems probable, were a favourite ornament in gardens; and flowers †, roses ‡, especially, were much esteemed, perfumes indeed having been always highly valued in warm climates. Virgil places Anchises in Elysium, in a grove of bays; and is careful to remark, that they were of the sweet-scented kind. The Pæstan roses were chiefly valued for their excellent odour; and the same quality appears to be the cause why they were placed by Tibullus as ornaments to the Elysian fields. There appears also to have prevailed among the Romans a piece of luxury relative to gardens, which is equally prevalent at present among us, namely the forcing of flowers at seasons of the year not suited to their natural blowing: and roses were then, as at present, the principal flowers upon which these experiments were tried, as appears from Martial ‡ and others.

When Roman authors (Mr Walpole remarks), whose climate instilled a wish for cool retreats, speak of their enjoyments in that kind, they sigh for grottos and caves, and the refreshing hollows of mountains, near ir-
 riguous and shady founts; or boast of their porticos, walks of planes, canals, baths, and breezes from the sea. Their gardens are never mentioned as affording shade and shelter from the rage of the dog-star. Pliny has left us descriptions of two of his villas. As he used his Laurentine villa for his winter retreat, it is not surprising that the garden makes no considerable part of the account. All he says of it is, that the gestatio or place of exercise, which surrounded the garden (the

Contra
Apion, l. 1.
§ 19

Q. Curt.
l. 5.

Esther vii.
7.
Oecon.

L. 36.
c. 4.

Diod. l. 2.

Elog. vii.
c. 65, &c.
Geor. iv.
118.

† Vide
Epigr. l. vi.
cp. 80.
l. xiv. cp.
127. and
Lampridius
in vit. Ele-
gab.

latter consequently not being very large), was bounded by a hedge of box, and, where that was perished, with rosemary; that there was a walk of vines; and that most of the trees were fig and mulberry, the soil not being proper for any other sorts. On his Tuscan villa he is more diffuse; the garden makes a considerable part of the description:—and what was the principal beauty of that pleasure-ground? Exactly what was the admiration of this country about threescore years ago; box-trees cut into monsters, animals, letters, and the names of the master and the artificer. In an age when architecture displayed all its grandeur, all its purity, and all its taste; when arose Vespasian's amphitheatre, the temple of Peace, Trajan's forum, Domitian's baths, and Adrian's villa, the ruins and vestiges of which still excite our astonishment and curiosity; a Roman consul, a polished emperor's friend, and a man of elegant literature and taste, delighted in what the mob now scarce admire in a college-garden. All the ingredients of Pliny's corresponded exactly with those laid out by London and Wise on Dutch principles. He talks of slopes, terraces, a wilderness, shrubs methodically trimmed, a marble basin, pipes spouting water, a cascade falling into the basin, bay-trees alternately planted with planes, and a straight walk, from whence issued others parted off by hedges of box and apple-trees, with obelisks placed between every two. There wants nothing but the embroidery of a parterre, to make a garden in the reign of Trajan serve for a description of one in that of king William. In one passage above, Pliny seems to have conceived that natural irregularity might be a beauty; in *opere urbanissimo*, says he, *subita velut illati rursus imitatio*. Something like a rural view was contrived amidst so much polished composition. But the idea soon vanished, lineal walks immediately enveloped the slight scene, and names and inscriptions in box again succeeded to compensate for the daring introduction of nature.

In the paintings found at Herculaneum are a few traces of gardens, as may be seen in the second volume of the prints. They are small square inclosures, formed by trellis-work and espaliers, and regularly ornamented with vases, fountains, and caretides, elegantly symmetrical, and proper for the narrow spaces allotted to the garden of a house in a capital city.

From what has been said, it appears how naturally and insensibly the idea of a kitchen-garden slid into that which has for so many ages been peculiarly termed a *garden*, and by our ancestors in this country distinguished by the name of a *pleasure-garden*. A square piece of ground was originally parted off in early ages for the use of the family:—to exclude cattle, and ascertain the property, it was separated from the fields by a hedge. As pride and desire of privacy increased, the inclosure was dignified by walls; and in climes where fruits were not lavished by the ripening glow of nature and soil, fruit-trees were assisted and sheltered from surrounding winds by the like expedient; for the inundation of luxuries, which have swelled into general necessities, have almost all taken their source from the simple fountain of reason.

When the custom of making square gardens inclosed with walls was thus established to the exclusion of nature and prospect, pomp and solitude combined to call for something that might enrich and enliven the

insipid and unanimated partition. Fountains, first invented for use, which grandeur loves to disguise and throw out of the question, received embellishments from costly marbles, and at last, to contradict utility, tossed their waste of waters into air in spouting columns. Art, in the hands of rude man, had at first been made a succedaneum to nature; in the hands of ostentatious wealth, it became the means of opposing nature; and the more it traversed the march of the latter, the more nobility thought its power was demonstrated. Canals measured by the line were introduced in lieu of meandering streams, and terraces were hoisted aloft in opposition to the facile slopes that imperceptibly unite the valley to the hill. Balustrades defended these precipitate and dangerous elevations, and flights of steps rejoined them to the subjacent flat from which the terrace had been dug. Vases and sculpture were added to these unnecessary balconies, and statues furnished the lifeless spot with mimic representations of the excluded sons of men. Thus difficulty and expence were the constituent parts of those sumptuous and selfish solitudes; and every improvement that was made, was but a step farther from nature. The tricks of water-works to wet the unwary, not to refresh the panting spectator, and parterres embroidered in patterns like a petticoat, were but the childish endeavours of fashion and novelty to reconcile greatness to what it had surfeited on. To crown these impotent displays of false taste, the sheers were applied to the lovely wildness of form with which nature has distinguished each various species of tree and shrub. The venerable oak, the romantic beech, the useful elm, even the aspiring circuit of the lime, the regular round of the chestnut, and the almost moulded orange-tree, were corrected by such fantastic admirers of symmetry. The compass and square were of more use in plantations than the nursery-man. The measured walk, the quincunx, and the etoile, imposed their unsatisfying sameness on every royal and noble garden. Trees were headed, and their sides pared away; many French groves seem green chests set upon poles. Seats of marble, arbours, and summer-houses, terminated every vista; and symmetry, even where the space was too large to permit its being remarked at one view, was so essential, that, as Pope observed,

—each alley has a brother,
And half the garden just reflects the other.

Knots of flowers were more defensibly subjected to the same regularity. Leisure, as Milton expressed it,

—in trim gardens took his pleasure.

In the garden of Marshal de Biron at Paris, consisting of 14 acres, every walk is buttoned on each side by lines of flower-pots, which succeed in their seasons.

It does not precisely appear what our ancestors meant by a bower:—It was probably an arbour; sometimes it meant the whole frittered inclosure, and in one instance it certainly included a labyrinth. Rosamond's bower was indisputably of that kind; though whether composed of walls or hedges, we cannot determine. A square and a round labyrinth were so capital ingredients of a garden formerly, that in Du Cerceau's architecture, who lived in the time of Charles IX. and Henry III. there is scarce a ground-plot without one of each.

In Kip's Views of the Seats of our Nobility and Gentry, we see the same tiresome and returning uniformity.

formity. Every house is approached by two or three gardens, consisting perhaps of a gravel-walk and two grass-plats or borders of flowers. Each rises above the other by two or three steps, and as many walls and terraces, and so many iron gates, that we recollect those ancient romances in which every entrance was guarded by nymphs or dragons. Yet though these and such preposterous inconveniences prevailed from age to age, good sense in this country had perceived the want of something at once more grand and more natural. These reflections, and the bounds set to the waste made by royal spoilers, gave origin to Parks. They were contracted forests; and extended gardens. Hentzner says, that, according to Rous of Warwick, the first park was that at Woodstock. If so, it might be the foundation of a legend that Henry II. secured his mistress in a labyrinth: it was no doubt more difficult to find her in a park than in a palace, where the intricacy of the woods and various lodges buried in covert might conceal her actual habitation.

It is more extraordinary that, having so long ago stumbled on the principle of modern gardening, we should have persisted in retaining its reverse, symmetrical and unnatural gardens. That parks were rare in other countries, Hentzner, who travelled over great part of Europe, leads us to suppose, by observing that they were common in England. In France they retain the name, but nothing is more different both in compass and disposition. Their parks are usually square or oblong inclosures, regularly planted with walks of chestnuts or limes, and generally every large town has one for its public recreation.

"One man, one great man we had (continues Mr Walpole), on whom nor education nor custom could impose their prejudices; who, 'on evil days though fallen, and with darkness and solitude compassed round,' judged that the mistaken and fantastic ornaments he had seen in gardens, were unworthy of the Almighty hand that planted the delights of Paradise. He seems with the prophetic eye of taste to have conceived, to have foreseen modern gardening; as Lord Bacon announced the discoveries since made by experimental philosophy. The description of Eden is a warmer and more just picture of the present style than Claud Lorrain could have painted from Hagley or Stourhead. The first lines we shall quote exhibit Stourhead on a more magnificent scale:

Thro' Eden went a river large,
Nor chang'd his course; but thro' the shaggy hill
Pats'd underneath ingulph'd; for God had thrown
That mountain as his garden mound, high rais'd
Upon the rapid current—

Hagley seems pictured in what follows:

Which thro' veins
Of porous earth with kindly thirst updrawn,
Rose a fresh fountain, and with many a rill
Water'd the garden—

What colouring, what freedom of pencil, what landscape in these lines!

—from that sapphire fount the crisped brooks,
Rolling on orient pearl and sands of gold,
With mazy error under pendent shades,
Ran nectar, visiting each plant, and fed
Flow'rs worthy of Paradise, which not *nice art*
In beds and curious knots, but nature boon
Pour'd forth profuse on hill and dale and plain,
Both where the morning sun first warmly smote
The open field, and where the unpiere'd shade
In brown & the noon-tide bow'rs.—*Thus was this place*
A happy rural seat of various view,

Read this transporting description; paint to your mind the scenes that follow, contrast them with the savage but respectable terror with which the poet guards the bounds of his paradise, fenced

—with the champaign head
Of a steep wilderness, whose hairy sides
With thicket overgrown, grotesque and wild,
Access denied; and over head up grew
Insufferable height of loftiest shade,
Cedar and pine, and fir, and branching palm,
A sylvan scene, and, as the ranks ascend,
Shade above shade, a woody theatre,
Of stateliest view—

and then recollect, that the author of this sublime vision had never seen a glimpse of any thing like what he has imagined; that his favourite ancients had dropped not a hint of such divine scenery; and that the conceits in Italian gardens, and Theobalds and Nonsuch, were the brightest originals that his memory could furnish. His intellectual eye saw a nobler plan, so little did he suffer by the loss of sight. It sufficed him to have seen the materials with which he could work. The vigour of a boundless imagination told him how a plan might be disposed, that would embellish nature, and restore art to its proper office, the just improvement or imitation of it.

"Now let us turn to an admired writer, posterior to Milton, and see how cold, how insipid, how tasteless is his account of what he pronounced a perfect garden. We speak not of his style, which it was not necessary for him to animate with the colouring and glow of poetry. It is his want of ideas, of imagination, of taste, that deserve censure, when he dictated on a subject which is capable of all the graces that a knowledge of beautiful nature can bestow. Sir William Temple was an excellent man; Milton, a genius of the first order.

"We cannot wonder that Sir William declares in favour of parterres, fountains, and statues, as necessary to break the sameness of large grass-plats, which he thinks have an ill effect upon the eye, when he acknowledges that he discovers fancy in the gardens of Alcinoüs. Milton studied the ancients with equal enthusiasm, but no bigotry; and had judgment to distinguish between the want of invention and the beauties of poetry. Compare his paradise with Homer's garden, both ascribed to a celestial design. For Sir William, it is just to observe, that his ideas centered in a fruit-garden. He had the honour of giving to his country many delicate fruits, and he thought of little else than disposing them to the best advantage.

"The best figure of a garden (says he) is either a square or an oblong, and either upon a flat or a descent: they have all their beauties, but the best I esteem 'an oblong upon a descent. The beauty, the air, the view, make amends for the expence, which is very great in finishing and supporting the terrace-walks, in levelling the parterres, and in the stone-fairs that are necessary from one to the other. The perfectest figure of a garden I ever saw, either at home or abroad, was that of Moor-park in Hertfordshire, when I knew it about 30 years ago. It was made by the Countess of Bedford, esteemed among the greatest wits of her time, and celebrated by Dr Donne; and with very great care, excellent contrivance, and much cost; but greater sums may be thrown away without effect or honour, if there want sense in proportion to money, or
' if

'if nature be not followed;' which I take to be the great rule in this, and perhaps in every thing else, as far as the conduct not only of our lives but our governments.' [We shall see how natural that admired garden was.] 'Because I take the garden I have named to have been in all kinds the most beautiful and perfect, at least in the figure and disposition, that I ever have seen, I will describe it for a model to those that meet with such a situation, and are above the regards of common expence. It lies on the side of a hill, upon which the house stands, but not very steep. The length of the house, where the best rooms and of most use or pleasure are, lies upon the breadth of the garden; the great parlour opens into the middle of a terrace gravel-walk that lies even with it, and which may lie, as I remember, about 300 paces long, and broad in proportion; the border set with standard laurels and at large distances, which have the beauty of orange-trees out of flower and fruit. From this walk are three descents by many stone-steps, in the middle and at each end, into a very large parterre. This is divided into quarters by gravel-walks, and adorned with two fountains and eight statues in the several quarters. At the end of the terrace-walk are two summer-houses, and the sides of the parterre are ranged with two large cloisters open to the garden, upon arches of stone, and ending with two other summer-houses even with the cloisters, which are paved with stone, and designed for walks of shade, there being none other in the whole parterre. Over these two cloisters are two terraces covered with lead and fenced with balusters; and the passage into these airy walks is out of the two summer-houses at the end of the first terrace-walk. The cloister facing the south is covered with vines, and would have been proper for an orange-house, and the other for myrtles or other more common greens, and had, I doubt not, been cast for that purpose, if this piece of gardening had been then in as much vogue as it is now. From the middle of this parterre is a descent by many steps flying on each side of a grotto that lies between them, covered with lead and flat, into the lower garden, which is all fruit-trees ranged about the several quarters of a wilderness, which is very shady; the walks here are all green, the grotto embellished with figures of shell rock-work, fountains, and water-works. If the hill had not ended with the lower garden, and the wall were not bounded by a common way that goes through the park, they might have added a third quarter of all greens; but this want is supplied by a garden on the other side the house, which is all of that sort, very wild, shady, and adorned with rough rock-work and fountains. This was Moor-park when I was acquainted with it, and the sweetest place, I think, that I have seen in my life, either before or since, at home or abroad.'

"It is unnecessary to add any remarks on this description. Any man might design and build as sweet a garden, who had been born in and never stirred out of Holborn. It was not, however, peculiar to Sir William Temple to think in that manner. How many Frenchmen are there who have seen our gardens, and still prefer natural flights of steps and shady cloisters covered with lead! Le Nautre, the architect of the groves and grottos at Versailles, came hither on a mission to improve our taste. He planted St James's and

Greenwich Parks—no great monuments of his invention.

"To do farther justice to Sir William Temple, we must not omit what he adds. 'What I have said of the best forms of gardens is meant only of such as are in some sort regular; for there may be other forms wholly irregular, that may, for aught I know, have more beauty than any of the others; but they must owe it to some extraordinary dispositions of nature in the seat, or some great race of fancy or judgment in the contrivance, which may reduce many disagreeing parts into some figure, which shall yet, upon the whole, be very agreeable. Something of this I have seen in some places, but heard more of it from others, who have lived much among the Chineses, a people whose way of thinking seems to lie as wide of ours in Europe as their country does. Their greatest reach of imagination is employed in contriving figures, where the beauty shall be great and strike the eye, but without any order or disposition of parts; that shall be commonly or easily observed. And though we have hardly any notion of this sort of beauty, yet they have a particular word to express it; and when they find it hit their eye at first sight, they say the Sharawadgi is fine or is admirable, or any such expression of esteem: but I should hardly advise any of these attempts in the figure of gardens among us; they are adventures of too hard achievement for any common hands; and though there may be more honour if they succeed well, yet there is more dishonour if they fail, and it is twenty to one they will; whereas in regular figures it is hard to make any great and remarkable faults.'

"Fortunately Kent and a few others were not quite so timid, or we might still be going up and down stairs in the open air. It is true, we have heard much lately, as Sir William Temple did, of irregularity and imitations of nature in the gardens or grounds of the Chinese. The former is certainly true: they are as whimsically irregular, as European gardens are formally uniform and unvaried:—but with regard to nature, it seems as much avoided, as in the squares and oblongs and straight lines of our ancestors. An artificial perpendicular rock starting out of a flat plain, and connected with nothing, often pierced through in various places with oval hollows, has no more pretension to be deemed natural than a lineal terrace or a parterre. The late Mr Joseph Spence, who had both taste and zeal for the present style, was so persuaded of the Chinese Emperor's pleasure-ground being laid out on principles resembling ours, that he translated and published, under the name of Sir Harry Beaumont, a particular account of that inclosure from the Collection of the Letters of the Jesuits. But except a determined irregularity, one can find nothing in it that gives any idea of attention being paid to nature. It is of vast circumference, and contains 200 palaces, besides as many contiguous for the eunuchs, all gilt, painted, and varnished. There are raised hills from 20 to 60 feet high, streams and lakes, and one of the latter five miles round. These waters are passed by bridges:—but even their bridges must not be straight—they serpentine as much as the rivulets, and are sometimes so long as to be furnished with resting-places, and begin and end with triumphal arches. The colonades undulate in the same manner. In short, this pretty gaudy

dy scene is the work of caprice and whim, and, when we reflect on their buildings, presents no image but that of unsubstantial tawdriness. Nor is this all. Within this fantastic Paradise is a square town, each side a mile long. Here the eunuchs of the court, to entertain his imperial majesty with the bustle and business of the capital in which he resides, but which it is not of his dignity ever to see, act merchants and all sorts of trades, and even designedly exercise for his royal amusement every art of knavery that is practised under his auspicious government. Methinks this is the childish solace and repose of grandeur, not a retirement from affairs to the delights of rural life. Here too his majesty plays at agriculture: there is a quarter set apart for that purpose; the eunuchs sow, reap, and carry in their harvest, in the imperial presence; and his majesty returns to Peking, persuaded that he has been in the country.

"Having thus cleared our way by ascertaining what have been the ideas on gardening in all ages, as far as we have materials to judge by, it remains to show to what degree Mr Kent invented the new style, and what hints he had received to suggest and conduct his undertaking.

"We have seen what Moor-park was, when pronounced a standard. But as no succeeding generation in an opulent and luxurious country contents itself with the perfection established by its ancestors, more perfect perfection was still sought; and improvements had gone on, till London and Wife had stocked all our gardens with giants, animals, monsters, coats of arms, and mottos, in yew, box, and holly. Absurdity could go no farther, and the tide turned. Bridgman, the next fashionable designer of gardens, was far more chaste; and whether from good sense, or that the nation had been struck and reformed by the admirable paper in the *Guardian*, No 173, he banished verdant sculpture, and did not even revert to the square precision of the foregoing age. He enlarged his plans, disdained to make every division tally to its opposite; and though he still adhered much to straight walks with high clipped hedges, they were only his great lines; the rest he diversified by wilderness, and with loose groves of oak, though still within surrounding hedges. As his reformation gained footing, he ventured, in the royal garden at Richmond, to introduce cultivated fields, and even morsels of a forest appearance, by the sides of those endless and tiresome walks that stretched out of one into another without intermission. But this was not till other innovators had broke loose too from rigid symmetry.

"But the capital stroke, the leading step to all that has followed, was the destruction of walls for boundaries, and the invention of fosses—an attempt then deemed so astonishing, that the common people called them Ha! Ha's! to express their surprise at finding a sudden and unperceived check to their walk.

"A sunk fence may be called the *leading step*, for these reasons. No sooner was this simple enchantment made, than levelling, mowing, and rolling, followed. The contiguous ground of the park without the sunk fence was to be harmonized with the lawn within; and the garden in its turn was to be set free from its prim regularity, that it might afford with the wilder country

without. The sunk fence ascertained the specific garden; but that it might not draw too obvious a line of distinction between the neat and the rude, the contiguous out-lying parts came to be included in a kind of general design; and when nature was taken into the plan, under improvements, every step that was made pointed out new beauties, and inspired new ideas. At that moment appeared Kent, painter enough to taste the charms of landscape, bold, and opinionative enough to dare and to dictate, and born with a genius to strike out a great system from the twilight of imperfect essays. He leaped the fence, and saw that all nature was a garden. He felt the delicious contrast of hill and valley changing imperceptibly into each other, tasted the beauty of the gentle swell or concave scoop, and remarked how loose groves crowned an easy eminence with happy ornament; and while they called in the distant view between their graceful stems, removed and extended the perspective by delusive comparison.

"Thus the pencil of his imagination bestowed all the arts of landscape on the scenes he handled. The great principles on which he worked were perspective, and light and shade. Groupes of trees broke too uniform or too extensive a lawn; evergreens and woods were opposed to the glare of the champaign; and where the view was less fortunate, or so much exposed as to be beheld at once, he blotted out some parts by thick shades, to divide it into variety, or to make the richest scene more enchanting by reserving it to a farther advance of the spectator's step. Thus, selecting favourite objects, and veiling deformities by screens of plantation; sometimes allowing the rudest waste to add its soil to the richest theatre: he realised the compositions of the greatest masters in painting. Where objects were wanting to animate his horizon, his taste as an architect could bestow immediate termination. His buildings, his seats, his temples, were more the works of his pencil than of his compasses. We owe the restoration of Greece and the diffusion of architecture to his skill in landscape.

"But of all the beauties he added to the face of this beautiful country, none surpassed his management of water. Adieu to canals, circular basins, and cascades tumbling down marble steps, that last absurd magnificence of Italian and French villas. The forced elevation of cataracts was no more. The gentle stream was taught to serpentine seemingly at its pleasure; and where discontinued by different levels, its course appeared to be concealed by thickets properly interspersed, and glittered again at a distance where it might be supposed naturally to arrive. Its borders were smoothed, but preserved their waving irregularity. A few trees scattered here and there on its edges sprinkled the tame bank that accompanied its meanders; and when it disappeared among the hills, shades descending from the heights leaned towards its progress, and framed the distant point of light under which it was lost, as it turned aside to either hand of the blue horizon.

"Thus, dealing in none but the colours of nature, and catching its most favourable features, men saw a new creation opening before their eyes. The living landscape was chastened or polished, not transformed.

Freedom was given to the forms of trees: they extended their branches unrestrained; and where any eminent oak, or master beech, had escaped maiming and survived the forest, bush and bramble was removed, and all its honours were restored to distinguish and shade the plain. Where the united plumage of an ancient wood extended wide its undulating canopy, and stood venerable in its darkness, Kent thinned the foremost ranks, and left but so many detached and scattered trees, as softened the approach of gloom, and blended a chequered light with the thus lengthened shadows of the remaining columns.

"Succeeding artists have added new master-strokes to these touches; perhaps improved or brought to perfection some that have been named. The introduction of foreign trees and plants, which we owe principally to Archibald Duke of Argyle, contributed essentially to the richness of colouring so peculiar to our modern landscape. The mixture of various greens, the contrast of forms between our forest-trees and the northern and West Indian firs and pines, are improvements more recent than Kent, or but little known to him. The weeping-willow, and every florid shrub, each tree of delicate or bold leaf, are new tints in the composition of our gardens.

"But just as the encomiums are that have been bestowed on Kent's discoveries, he was neither without assistance or faults. Mr Pope undoubtedly contributed to form his taste. The design of the Prince of Wales's garden at Carlton-house was evidently borrowed from the Poet's at Twickenham. There was a little of affected modesty in the latter, when he said, of all his works he was most proud of his garden. And yet it was a singular effort of art and taste to impress so much variety and scenery on a spot of five acres. The passing through the gloom from the grotto to the opening day, the retiring and again assembling shades, the dusky groves, the larger lawn, and the solemnity of the termination at the cypresses that lead up to his mother's tomb, are managed with

exquisite judgment; and though Lord Peterborough assisted him

To form his quincunx and to rank his vines, those were not the most pleasing ingredients of his little perspective.

"Having routed professed art (for the modern gardener exerts his talents to conceal his art), Kent, like other reformers, knew not how to stop at the just limits. He had followed Nature, and imitated her so happily, that he began to think all her works were equally proper for imitation. In Kensington garden he planted dead trees, to give a greater air of truth to the scene—but he was soon laughed out of this excess. His ruling principle was, that nature abhors a straight line. His mimics, for every genius has his apes, seemed to think that she could love nothing but what was crooked. Yet so many men of taste of all ranks devoted themselves to the new improvements, that it is surprising how much beauty has been struck out, with how few absurdities. Still in some lights the reformation seems to have been pushed too far. Though an avenue crossing a park or separating a lawn, and intercepting views from the seat to which it leads, are capital faults; yet a great avenue cut through woods, perhaps before entering a park, has a noble air, and

Like footmen running before coaches
To tell the inn what lord approaches,

announces the habitation of some man of distinction. In other places the total banishment of all particular neatness immediately about a house, which is frequently left gazing by itself in the middle of a park, is a defect. Sheltered and even close walks, in so very uncertain a climate as ours, are comforts ill exchanged for the few picturesque days that we enjoy; and whenever a family can purloin a warm and even something of an old-fashioned garden from the landscape designed for them by the undertaker in fashion, without interfering with the picture, they will find satisfactions on those days that do not invite strangers to come and see their improvements."

PART I. PRINCIPLES OF GARDENING.

GARDENING, in the perfection to which it has been lately brought in Britain, is intitled to a place of considerable rank among the liberal arts. It is (says Mr Wheatley) as superior to landscape-painting as a reality to a representation: it is an exertion of fancy; a subject for taste; and being released now from the restraints of regularity, and enlarged beyond the purposes of domestic convenience, the most beautiful, the most simple, the most noble scenes of nature, are all within its province. For it is no longer confined to the spots from which it takes its name; but, as already observed, regulates also the disposition and embellishments of a park, a farm, a forest, &c. and the business of a gardener is to select and apply whatever is great, elegant, or characteristic, in any of them to discover, and to show all the advantages of the place upon which he is employed; to supply its defects, to correct its faults, and to improve its beauties.

N^o 134.

SECT. I. *Materials of Gardening.*

THESE may be divided into two general classes; *Natural*, and *Facitious*.

§ 1. *Of the NATURAL MATERIALS.*

THESE, according to Mr Wheatley's enumeration, are: Ground, Wood, Water, and Rocks.

I. GROUND. By this is meant that portion of naked surface which is included within the place to be improved; whether that surface be swamp, lawn, roughet, or broken ground; and whether it be a height, a valley, a plain, or a composition of swells, dips, and levels.

The following passage has been quoted from Mr Gilpin's observations on the Wye*, as affording a sublime idea of what ground ought to be.—"Nothing (says he) gives so just an idea of the beautiful swellings of ground as those of water, where it
has

Wood.

has sufficient room to undulate and expand. In ground which is composed of very refractory materials, you are presented often with harsh lines, angular insertions, and disagreeable abruptnesses. In water, whether in gentle or in agitated motion, all is easy, all is softened into itself; and the hills and the valleys play into each other in a variety of the most beautiful forms. In agitated water, abruptnesses indeed there are, but yet they are such abruptnesses as in some part or other unite properly with the surface around them; and are on the whole peculiarly harmonious. Now, if the ocean in any of these swellings and agitations could be arrested and fixed, it would produce that pleasing variety which we admire in ground. Hence it is common to fetch our images from water, and apply them to land: we talk of an undulating line, a playing lawn, and a billowy surface; and give a much stronger and more adequate idea by such imagery, than plain language could possibly present."

The exertions of art, however, are here inadequate; and the artist ought not attempt to create a mountain, a valley, or a plain: he should but rarely meddle even with the smaller inequalities of grounds. Roughets and broken ground may generally be reduced to lawn, or hid with wood; and a swamp may be drained or covered with water; whilst lawn may be variegated at pleasure by wood, and sometimes by water.

II. WOOD, as a general term, comprehends all trees and shrubs in whatever disposition; but it is specifically applied in a more limited sense, and in that sense we shall now use it.

Every plantation must be either a *wood*, a *grove*, or a *clump*. A wood is composed both of trees and underwood, covering a considerable space. A grove consists of trees without underwood. A clump differs from either only in extent: it may be either close or open: when close, it is sometimes called a *thicket*; when open, a *groupe of trees*; but both are equally clumps, whatever may be the shape or situation.

1. One of the noblest objects in nature (Mr Wheatley observes) is the *surface of a large thick wood*, commanded from an eminence, or seen from below hanging on the side of a hill. The latter is generally the more interesting object. Its aspiring situation gives it an air of greatness; its termination is commonly the horizon: and, indeed, if it is deprived of that splendid boundary, if the brow appears above it (unless some very peculiar effect characterises that brow), it loses much of its magnificence: it is inferior to a wood which covers a less hill from the top to the bottom; for a whole space filled is seldom little. But a wood commanded from an eminence is generally no more than a part of the scene below; and its boundary is often inadequate to its greatness. To continue it, therefore, till it winds out of sight, or loses itself in the horizon, is generally desirable: but then the varieties of its surface grow confused as it retires; while those of a hanging wood are all distinct, the furthest parts are held up to the eye, and none are at a distance though the whole be extensive.

The varieties of a surface are essential to the beauty of it: a continued smooth shaven level of foliage is neither agreeable nor natural; the different growths of trees commonly break it in reality, and their sha-

dows still more in appearance. These shades are so many tints, which, undulating about the surface, are its greatest embellishment; and such tints may be produced with more effect, and more certainty, by a judicious mixture of greens; at the same time an additional variety may be introduced, by grouping and contrasting trees very different in shape from each other; and whether variety in the greens or in the forms be the design, the execution is often easy, and seldom to a certain degree impossible. In raising a young wood, it may be perfect. In old woods, there are many spots which may be either thinned or thickened: and there the characteristic distinctions should determine what to plant, or which to leave; at the least will often point out those which, as blemishes, ought to be taken away; and the removal of two or three trees will sometimes accomplish the design. The number of beautiful forms, and agreeable masses, which may decorate the surface, is so great, that where the place will not admit of one, another is always ready; and as no delicacy of finishing is required, no minute exactness is worth regarding; great effects will not be disconcerted by small obstructions and little disappointments.

The contrasts, however, of masses and of groupes must not be too strong, where *greatness* is the character of the wood; for unity is essential to greatness: and if direct opposites be placed close together, the wood is no longer one object; it is only a confused collection of several separate plantations. But if the progress be gradual from the one to the other, shapes and tints widely different may assemble on the same surface; and each should occupy a considerable space: a single tree, or a small cluster of trees, in the midst of an extensive wood, is in size but a speck, and in colour but a spot; the groupes and the masses must be large to produce any sensible variety.

When, in a romantic situation, very broken ground is overspread with wood, it may be proper on the surface of the wood to mark the inequalities of the ground. *Rudeness*, not greatness, is the prevailing idea; and a choice directly the reverse of that which is productive of unity, will produce it. Strong contrasts, even oppositions, may be eligible; the aim is rather to disjoint than to connect: a deep hollow may sink into dark greens; an abrupt bank may be shown by a rising stage of aspiring trees, a sharp ridge by a narrow line of conical shapes: firs are of great use upon such occasions; their tint, their form, their singularity, recommend them.

A hanging *wood of thin forest-trees*, and seen from below, is seldom pleasing: those few trees are by the perspective brought nearer together; it loses the beauty of a thin wood, and is defective as a thick one: the most obvious improvement, therefore, is to thicken it. But, when seen from an eminence, a thin wood is often a lively and elegant circumstance in a view; it is full of objects; and every separate tree shows its beauty. To increase that vivacity, which is the peculiar excellence of a thin wood, the trees should be characteristically distinguished both in their tints and their shapes; and such as for their airiness have been proscribed in a thick wood, are frequently the most eligible here. Differences also in their growths are a further source of variety; each should be considered as a distinct ob-

Of the surface of a wood.

Wood.

Wood.

2
Of the out-
line of a
wood.

ject, unless where a small number are grouped together; and then all that compose the little cluster must agree: but the groupes themselves, for the same reason as the separate trees, should be strongly contrasted; the continued underwood is their only connection, and that is not affected by their variety.

Though the surface of a wood, when commanded, deserves all these attentions, yet the *outline* more frequently calls for our regard: it is also more in our power; it may sometimes be great, and may always be beautiful. The first requisite is irregularity. That a mixture of trees and underwood should form a long straight line, can never be natural; and a succession of easy sweeps and gentle rounds, each a portion of a greater or less circle, composing all together a line literally serpentine, is, if possible, worse. It is but a number of regularities put together in a disorderly manner, and equally distant from the beautiful both of art and of nature. The true beauty of an outline consists more in breaks than in sweeps; rather in angles than in rounds; in variety, not in succession.

Every variety in the outline of a wood must be a *prominence* or a *recess*. Breadth in either is not so important as length to the one and depth to the other. If the former ends in an angle, the latter diminishes to a point; they have more force than a shallow dent, or a dwarf excrescence, how wide soever. They are greater deviations from the continued line which they are intended to break; and their effect is to enlarge the wood itself, which seems to stretch from the most advanced point, back beyond the most distant to which it retires. The extent of a large wood on a flat, not commanded, can by no circumstance be so manifestly shown as by a deep recess; especially if that recess wind so as to conceal the extremity, and leave the imagination to pursue it. On the other hand, the poverty of a shallow wood might sometimes be relieved by here and there a prominence, or clumps which by their apparent junction should seem to be prominences from it. A deeper wood with a continued outline, except when commanded, would not appear so considerable.

Wheatley's
Observat.
on Modern
Gardening.

An inlet into a wood seems to have been cut, if the opposite points of the entrance tally; and that show of art depreciates its merit: but a difference only in the situation of those points, by bringing one more forward than the other, prevents the appearance, though their forms be similar. Other points, which distinguish the great parts, should in general be strongly marked: a short turn has more spirit in it than a tedious circuit; and a line broken by angles has a precision and firmness, which in an undulated line are wanting; the angles should indeed commonly be a little softened; the rotundity of the plant which forms them is sometimes sufficient for the purpose; but if they are melted down too much, they lose all meaning. Three or four large parts thus boldly distinguished, will break a very long outline. When two woods are opposed on the sides of a narrow glade, neither has so much occasion for variety in itself as if it were single; if they are very different from each other, the contrast supplies the deficiency to each, and the interval between them is full of variety. The form of that interval is indeed of as much consequence as their own: though the outlines of both the woods be separately beautiful, yet if together they do not cast the open space into an

agreeable figure, the whole scene is not pleasing; and a figure is never agreeable, when the sides too closely correspond; whether they are exactly the same, or exactly the reverse of each other, they equally appear artificial.

Every variety of outline hitherto mentioned may be traced by the underwood alone; but frequently the same effects may be produced with more ease, and with much more beauty, by a few trees standing out from the thicket, and belonging, or seeming to belong, to the wood, so as to make a part of its figure. Even where they are not wanted for that purpose, detached trees are such agreeable objects, so distinct, so light, when compared to the covert about them, that skirting along it in some parts, and breaking it in others, they give an unaffected grace, which can no otherwise be given to the outline. They have a still further effect, when they stretch across the whole breadth of an inlet, or before part of a recess into the wood: they are themselves shown to advantage by the space behind them; and that space, seen between their stems, they in return throw into an agreeable perspective.

2. The prevailing character of a wood is generally of a Grove. grandeur: the principal attention therefore which it requires, is to prevent the excesses of that character, to diversify the uniformity of its extent, to lighten the unwieldiness of its bulk, and to blend graces with greatness. The character of a *grove* is beauty. Fine trees are lovely objects: a grove is an assemblage of them; in which every individual retains much of its own peculiar elegance, and whatever it loses is transferred to the superior beauty of the whole. To a grove, therefore, which admits of endless variety in the disposition of the trees, differences in their shapes and their greens are seldom very important, and sometimes they are detrimental. Strong contrasts scatter trees which are thinly planted, and which have not the connection of underwood; they no longer form one plantation; they are a number of single trees. A thick grove is not indeed exposed to this mischief, and certain situations may recommend different shapes and different greens for their effects upon the surface; but in the outline they are seldom much regarded. The eye attracted into the depth of the grove, passes by little circumstances at the entrance; even varieties in the form of the line do not always engage the attention: they are not so apparent as in a continued thicket, and are scarcely seen if they are not considerable.

But the surface and the outline are not the only circumstances to be attended to. Though a grove be beautiful as an object, it is besides delightful as a spot to walk or to sit in; and the choice and the disposition of the trees for effects within, are therefore a principal consideration. Mere irregularity alone will not please: strict order is there more agreeable than absolute confusion: and some meaning better than none. A regular plantation has a degree of beauty; but it gives no satisfaction, because we know that the same number of trees might be more beautifully arranged. A disposition, however, in which the lines only are broken, without varying the distances, is equally improper. The trees should gather into groupes, or stand in various irregular lines, and describe several figures: the intervals between them should be contrasted both in shape and in dimensions:

Wood.

Wood.

Ibid.

• New
Esher in
Barry.

sions: a large space should in some places be quite open; in others the trees should be so close together, as hardly to leave a passage between them; and in others as far apart as the connection will allow. In the forms and the varieties of these groupes, these lines, and these openings, principally consists the interior beauty of a grove.

The force of them is most strongly illustrated at Claremont*: where the walk to the cottage, though destitute of many natural advantages, and eminent for none; though it commands no prospect; though the water below it is a trifling pond; though it has nothing, in short, but inequality of ground to recommend it; is yet the finest part of the garden: for a grove is there planted in a gently curved direction, all along the side of a hill, and on the edge of a wood, which rises above it. Large recesses break it into several clumps, which hang down the declivity; some of them approaching, but none reaching quite to the bottom. These recesses are so deep as to form great openings in the midst of the grove; they penetrate almost to the covert; but the clumps being all equally suspended from the wood; and a line of open plantation, though sometimes narrow, running constantly along the top; a continuation of grove is preserved, and the connection between the parts is never broken. Even a groupe, which near one of the extremities stands out quite detached, is still in style so similar to the rest as not to lose all relation. Each of these clumps is composed of several others still more intimately united: each is full of groupes, sometimes of no more than two trees, sometimes of four or five, and now and then in larger clusters: an irregular waving line, issuing from some little crowd, loses itself in the next; or a few scattered trees drop in a more distant succession from the one to the other. The intervals, winding here like a glade, and widening there into broader openings, differ in extent, in figure, and direction; but all the groupes, the lines, and the intervals, are collected together into large general clumps, each of which is at the same time both compact and free, identical and various. The whole is a place wherein to tarry with secure delight, or saunter with perpetual amusement.

The grove at Esher-place was planted by the same masterly hand; but the necessity of accommodating the young plantation to some large trees which grew there before, has confined its variety. The groupes are few and small; there was not room for larger or for more: there were no opportunities to form continued narrow glades between opposite lines; the vacant space are therefore chiefly irregular openings spreading every way, and great differences of distance between the trees are the principal variety; but the grove winds along the bank of a large river, on the side and at the foot of a very sudden ascent, the upper part of which is covered with wood. In one place, it presses close to the covert; retires from it in another; and stretches in a third across a bold recess, which runs up high into the thicket. The trees sometimes overspread the flat below; sometimes leave an open space to the river; at other times crown the brow of a large knole, climb up a steep, or hang on a gentle declivity. These varieties in the situation more than compensate for the want of variety in the disposition of the trees; and the many happy circumstances which concur

— In Esher's peaceful grove,
Where Kent and nature vie for Pelham's love,

Wood.

render this little spot more agreeable than any at Claremont. But though it was right to preserve the trees already standing, and not to sacrifice great present beauties to still greater in futurity; yet this attention has been a restraint; and the grove at Claremont, considered merely as a plantation, is in delicacy of taste, and fertility of invention, superior to that at Esher.

It is, however, possible to secure both a present and a future effect, by fixing first on a disposition which will be beautiful when the trees are large, and then intermingling another which is agreeable while they are small. These occasional trees are hereafter to be taken away; and must be removed in time, before they become prejudicial to the others.

The consequence of variety in the disposition, is variety in the light and shade of the grove; which may be improved by the choice of the trees. Some are impenetrable to the fiercest sun-beam; others let in here and there a ray between the large masses of their foliage; and others, thin both of boughs and of leaves, only chequer the ground. Every degree of light and shade, from a glare to obscurity, may be managed; partly by the number, and partly by the texture, of the trees. Differences only in the manner of their growths have also corresponding effects: there is a closeness under those whose branches descend low, and spread wide; a space and liberty where the arch above is high; and frequent transitions from the one to the other are very pleasing. These still are not all the varieties of which the interior of a grove is capable: trees, indeed, whose branches nearly reach the ground, being each a sort of thicket, are inconsistent with an open plantation: but though some of the characteristic distinctions are thereby excluded, other varieties more minute succeed in their place; for the freedom of passage throughout brings every tree in its turn near to the eye, and subjects even differences in foliage to observation. These, slight as they may seem, are agreeable when they occur: it is true, they are not regretted when wanting; but a defect of ornament is not necessarily a blemish.

3. It has been already observed, that *Clumps* differ only in extent from woods, if they are close; or from groves, if they are open: they are small woods, and small groves, governed by the same principles as the larger, after allowances made for their dimensions. But besides the properties they may have in common with woods or with groves, they have others peculiar to themselves which require examination.

They are either *independent* or *relative*: when independent, their beauty, as single objects, is solely to be attended to; when relative, the beauty of the individuals must be sacrificed to the effect of the whole, which is the greater consideration.

The *occasions* on which independent clumps may be applied, are many. They are often desirable as beautiful objects in themselves; they are sometimes necessary to break an extent of lawn, or a continued line whether of ground or of plantation; but on all occasions a jealousy of art constantly attends them, which irregularity in their figure will not always alone remove. Though elevations show them to advantage, yet a hillock evidently thrown up on purpose to be crowned with a clump, is artificial to a degree of disgust:

gust: some of the trees should therefore be planted on the sides, to take off that appearance. The same expedient may be applied to clumps placed on the brow of a hill, to interrupt its sameness: they will have less ostentation of design, if they are in part carried down either declivity. The objection already made to planting many along such a brow, is on the same principle: a single clump is less suspected of art; if it be an open one, there can be no finer situation for it, than just at the point of an abrupt hill, or on a promontory into a lake or a river. It is in either a beautiful termination, distinct by its position, and enlivened by an expanse of sky or of water about and beyond it. Such advantages may balance little defects in its form: but they are lost if other clumps are planted near it; art then intrudes, and the whole is displeasing.

But though a multiplicity of clumps, when each is an independent object, seldom seems natural; yet a number of them may, without any appearance of art, be admitted into the same scene, if they bear a relation to each other: if by their succession they diversify a continued outline of wood, if between them they form beautiful glades, if all together they cast an extensive lawn into an agreeable shape, the effect prevents any scrupulousness into the means of producing it. But when the reliance on that effect is so great, every other consideration must give way to the beauty of the whole. The figure of the glade, of the lawn, or of the wood, are principally to be attended to: the finest clumps, if they do not fall easily into the great lines, are blemishes; their connections, their contrasts, are more important than their forms.

Of a Lake.

III. WATER. All inland water is either *running* or *stagnated*. When stagnated, it forms a *lake* or a *pool*, which differ only in extent; and a *pool* and a *pond* are the same. Running waters are either a *rivulet*, a *river*, or a *rill*; and these differ only in breadth: a *rivulet* and a *brook* are synonymous terms; a *stream* and a *current* are general names for all.

1. Space or expansion is essential to a *Lake*. It cannot be too large as a subject of description or of contemplation; but the eye receives little satisfaction when it has not a form on which to rest: the ocean itself hardly atones by all its grandeur for its infinity; and a prospect of it is, therefore, always most agreeable, when in some part, at no great distance, a reach of shore, a promontory, or an island, reduces the immensity into shape. An artificial lake, again, may be comparatively extravagant in its dimensions. It may be so out of proportion to its appendages, as to seem a waste of water; for all size is in some respects relative: if this exceeds its due dimensions, and if a flatness of shore beyond it adds still to the dreariness of the scene; wood to raise the banks, and objects to distinguish them, are the remedies to be employed. If the length of a piece of water be too great for its breadth so as to destroy all idea of circuit, the extremities should be considered as too far off, and made important to give them proximity; while at the same time the breadth may be favoured, by keeping down the banks on the sides. On the same principle, if the lake be too small, a low shore will, in appearance, increase the extent.

But it is not necessary that the whole scene be

bounded: if form be impressed on a considerable part, the eye can, without disgust, permit a large reach to stretch beyond its ken; it can even be pleased to observe a tremulous motion in the horizon, which shows that the water has not there yet attained its termination. Still short of this, the extent may be kept in uncertainty; a hill or a wood may conceal one of the extremities, and the country beyond it, in such a manner as to leave room for the supposed continuation of so large a body of water. Opportunities to choose this shape are frequent, and it is the most perfect of any: the scene is closed, but the extent of the lake is undetermined; a complete form is exhibited to the eye, while a boundless range is left open to the imagination.

But mere form will only give content, not delight: that depends upon the outline, which is capable of exquisite beauty; and the *bays*, the *creeks*, and the *promontories*, which are ordinary parts of that outline, together with the accidents of *islands*, of *inlets* and of *outlets* to rivers, are in their shapes and their combinations an inexhaustible fund of variety.

Bays, creeks, and promontories, however, though extremely beautiful, should not be very numerous: for a shore broken into little points and hollows has no certainty of outline; it is only ragged, not diversified; and the distinctness and simplicity of the great parts are hurt by the multiplicity of subdivisions. But islands, though the channels between them be narrow, do not so often derogate from greatness: they intimate a space beyond them whose boundaries do not appear; and remove to a distance the shore which is seen in perspective between them. Such partial interruptions of the sight suggest ideas of extent to the imagination.

2. Though the windings of a *River* are proverbially descriptive of its course; yet without being perpetually wreathed, it may be natural. Nor is the character expressed only by the turnings. On the contrary, if they are too frequent and sudden, the current is reduced into a number of separate pools, and the idea of progress is obscured by the difficulty of tracing it. Length is the strongest symptom of continuation: long reaches are therefore characteristic of a river, and they conduce much to its beauty; each is a considerable piece of water, and variety of beautiful forms may be given to their outlines.

A river requires a number of *accompaniments*. The changes in its course furnish a variety of situations; while the fertility, convenience, and amenity, which attend it, account for all appearances of inhabitants and improvement. Profusion of ornament on a fictitious river, is a just imitation of cultivated nature. Every species of building, every style of plantation, may abound on the banks; and whatever be their characters, their proximity to the water is commonly the happiest circumstance in their situation. A lustre is from thence diffused on all around; each derives an importance from its relation to this capital feature: those which are near enough to be reflected, immediately belong to it; those at a greater distance still share in the animation of the scene; and objects totally detached from each other, being all attracted towards the same interesting connection, are united into one composition.

In the front of Blenheim was a deep broad valley, which

Water.
Ibid.

which abruptly separated the castle from the lawn and the plantations before it; even a direct approach could not be made without building a monstrous bridge over the vast hollow: but this forced communication was only a subject of railery; and the scene continued broken into two parts, absolutely distinct from each other. This valley has been lately flooded: it is not filled; the bottom only is covered with water: the sides are still very high; but they are no longer the steepes of a chasm, they are the bold shores of a noble river. The same bridge is standing without alteration: but no extravagance remains; the water gives it propriety. Above it the river first appears, winding from behind a small thick wood, in the valley; and soon taking a determined course, it is then broad enough to admit an island filled with the finest trees: others, corresponding to them in growth and disposition, stand in groupes on the banks, intermixed with younger plantations. Immediately below the bridge, the river spreads into a large expanse: the sides are open lawn. On that furthest from the house formerly stood the palace of Henry II. celebrated in many an ancient ditty by the name of Fair Rosamond's Bower. A little clear spring, which rises there, is by the country people still called Fair Rosamond's Well. The spot is now marked by a single willow. Near it is a fine collateral stream, of a beautiful form, retaining its breadth as far as it is seen, and retiring at last behind a hill from the view. The main river, having received this accession, makes a gentle bend; then continues for a considerable length in one wide direct reach; and, just as it disappears, throws itself down a high cascade, which is the present termination. On one of the banks of this reach is the garden: the steepes are there diversified with thickets and with glades; but the covert prevails, and the top is crowned with lofty trees. On the other side is a noble hanging wood in the park: it was depreciated when it sunk into a hollow, and was poorly lost in the bottom; but it is now a rich appendage to the river, falling down an easy slope quite to the water's edge, where, without overshadowing, it is reflected on the surface. Another face of the same wood borders the collateral stream, with an outline more indented and various; while a very large irregular clump adorns the opposite declivity. This clump is at a considerable distance from the principal river: but the stream it belongs to brings it down to connect with the rest; and the other objects, which were before dispersed, are now, by the interest of each in a relation which is common to all, collected into one illustrious scene. The castle is itself a prodigious pile of building; which, with all the faults in its architecture, will never seem less than a truly princely habitation; and the confined spot where it was placed, on the edge of an abyss, is converted into a proud situation, commanding a beautiful prospect of water, and open to an extensive lawn, adequate to the mansion, and an emblem of its domain. In the midst of this lawn stands a column, a stately trophy, recording the exploits of the duke of Marlborough, and the gratitude of Britain. Between this pillar and the castle is the bridge, which now, applied to a subject worthy of it, is established in all the importance due to its greatness. The middle arch is wider than the Rialto, but

not too wide for the occasion; and yet this is the narrowest part of the river: but the length of the reaches is every where proportioned to their breadth. Each of them is alone a noble piece of water; and the last, the finest of all, loses itself gradually in a wood, which on that side is also the boundary of the lawn, and rises into the horizon. All is great in the front of Blenheim: but in that vast space no void appears; so important are the parts, so magnificent the objects. The plain is extensive, the valley is broad, the wood is deep. Though the intervals between the buildings are large, they are filled with the grandeur which buildings of such dimensions and so much pomp diffuse all around them; and the river, in its long varied course, approaching to every object, and touching upon every part, spreads its influence over the whole.

In the composition of this scene, the river, both as a part itself, and as uniting the other parts, has a principal share. But water is not lost though it be in so confined or so concealed a spot as to enter into no view; it may render that spot delightful. It is capable of the most exquisite beauty in its form; and though not in space, may yet in disposition have pretensions to greatness; for it may be divided into several branches, which will form a cluster of islands all connected together, make the whole place irriguous, and, in the stead of extent, supply a quantity of water. Such a sequestered scene usually owes its retirement to the trees and the thickets with which it abounds: but, in the disposition of them, one distinction should be constantly attended to. A river flowing through a wood which overspreads one continued surface of ground, and a river between two woods, are in very different circumstances. In the latter case, the woods are separate; they may be contrasted in their forms and their characters, and the outline of each should be forcibly marked. In the former, no outline ought to be discernible; for the river passes between trees, not between boundaries; and though, in the progress of its course, the style of the plantations may be often changed, yet on the opposite banks a similarity should constantly prevail, that the identity of the wood may never be doubtful.

A river between two woods may enter into a view; and then it must be governed by the principles which regulate the conduct and the accompaniments of a river in an open exposure. But when it runs through a wood, it is never to be seen in prospect: the place is naturally full of obstructions; and a continued opening, large enough to receive a long reach, would seem an artificial cut. The river must therefore necessarily wind more than in crossing a lawn, where the passage is entirely free. But its influence will never extend so far on the sides: the buildings must be near the banks; and, if numerous, will seem crowded, being all in one track, and in situations nearly alike. The scene, however, does not want variety: on the contrary, none is capable of more. The objects are not indeed so different from each other as in an open view; but they are very different, and in much greater abundance: for this is the interior of a wood, where every tree is an object, every combination of trees a variety, and no large intervals are requisite to distinguish the several dispositions; the grove, the thicket, or the groupes, may

Water.
Ibid.

may prevail, and their forms and their relations may be constantly changed, without restraint of fancy, or limitation of number.

• Vale of
Aylesbury,
Bucking-
hamshire.

Water is so universally and so deservedly admired in a prospect, that the most obvious thought in the management of it, is to lay it as open as possible, and purposely to conceal it would generally seem a severe self-denial: yet so many beauties may attend its passage through a wood, that larger portions of it might be allowed to such retired scenes than are commonly spared from the view, and the different parts in different styles would be fine contrasts to each other. If the water at Wotton* were all exposed, a walk of near two miles along the banks would be of a tedious length, from the want of those changes of the scene which now supply through the whole extent a succession of perpetual variety. That extent is so large as to admit of a division into four principal parts, all of them great in style and in dimensions, and differing from each other both in character and situation. The two first are the least. The one is a reach of a river, about the third of a mile in length, and of a competent breadth, flowing through a lovely mead, open in some places to views of beautiful hills in the country, and adorned in others with clumps of trees, so large, that their branches stretch quite across, and form a high arch over the water. The next seems to have been once a formal basin encompassed with plantations, and the appendages on either side still retain some traces of regularity; but the shape of the water is free from them: the size is about 14 acres; and out of it issue two broad collateral streams, winding towards a large river, which they are seen to approach, and supposed to join. A real junction is however impossible, from the difference of the levels; but the terminations are so artfully concealed, that the deception is never suspected, and when known is not easily explained. The river is the third great division of the water; a lake into which it falls, is the fourth. These two do actually join; but their characters are directly opposite; the scenes they belong to are totally distinct; and the transition from the one to the other is very gradual: for an island near the conflux, dividing the breadth, and concealing the end of the lake, moderates for some way the space; and permitting it to expand but by degrees, raises an idea of greatness, from uncertainty accompanied with increase. The reality does not disappoint the expectation; and the island, which is the point of view, is itself equal to the scene: it is large, and high above the lake; the ground is irregularly broken; thickets hang on the sides; and towards the top is placed an Ionic portico, which commands a noble extent of water, not less than a mile in circumference, bounded on one side with wood, and open on the other to two sloping lawns, the least of an hundred acres, diversified with clumps, and bordered by plantations. Yet this lake, when full in view, and with all the importance which space, form, and situation can give, is not more interesting than the sequestered river, which has been mentioned as the third great division of the water. It is just within the verge of a wood, three quarters of a mile long, every where broad, and its course is such as to admit of infinite variety without any confusion. The banks are cleared of underwood; but a few thickets still remain,

and on one side an impenetrable covert soon begins: the interval is a beautiful grove of oaks, scattered over a green sward of extraordinary verdure. Between these trees and these thickets the river seems to glide gently along, constantly winding, without one short turn or one extended reach in the whole length of the way. This even temper in the stream suits the scenes through which it passes; they are in general of a very sober cast, not melancholy, but grave; never exposed to a glare; never darkened with gloom; nor, by strong contrasts of light and shade, exhibiting the excess of either. Undisturbed by an extent of prospect without, or a multiplicity of objects within, they retain at all times a mildness of character; which is still more forcibly felt when the shadows grow faint as they lengthen, when a little rustling of birds in the spray, the leaping of the fish, and the fragrant of the woodbine, denote the approach of evening; while the setting sun shoots its last gleams on a Tuscan portico, which is close to the great basin, but which from a seat near this river is seen at a distance, through all the obscurity of the wood, glowing on the banks, and reflected on the surface of the water. In another still more distinguished spot is built an elegant bridge, with a colonnade upon it, which not only adorns the place where it stands, but is also a picturesque object to an octagon building near the lake, where it is shown in a singular situation, over-arched, encompassed, and backed with wood, without any appearance of the water beneath. This building in return is also an object from the bridge; and a Chinese room, in a little island just by, is another: neither of them are considerable, and the others which are visible are at a distance, but more or greater adventitious ornaments are not required in a spot so rich as this in beauties peculiar to its character. A profusion of water pours in from all sides round upon the view; the opening of the lake appears; a glimpse is caught of the large basin; one of the collateral streams is full in sight, and the bridge itself is in the midst of the finest part of the river: all seem to communicate the one with the other. Though thickets often intercept, and groupes perplex, the view, yet they never break the connection between the several pieces of water; each may still be traced along large branches, or little catches; which in some places are overshadowed and dim; in others glitten through a glade, or glimmer between the boles of trees in a distant perspective; and in one, where they are quite lost to the view, some arches of a stone-bridge, but partially seen among the wood, preserve their connection.

3. If a large river may sometimes, a smaller current of a Rill undoubtedly may often, be conducted through a wood; it seldom adorns, it frequently disfigures, a prospect, where its course is marked, not by any appearance of water, but by a confused line of clotted grass, which disagrees with the general verdure. A Rivulet may, indeed, have consideration enough for a home scene, though it be open; but a Rill is always most agreeable when most retired from public view. Its characteristic excellencies are vivacity and variety, which require attention, leisure, and silence, that the eye may pore upon the little beauties, and the ear listen to the low murmurs of the stream without interruption. To such indulgence a confined spot only is favourable; a close copse

Water.

Water.
Ibid.

copse is therefore often more acceptable than a high wood, and a sequestered valley at all times preferable to any open exposure: a single rill at a very little distance is a mere water-course; it loses all its charms; it has no importance in itself, and bears no proportion to the scene. A number of little streams have indeed an effect in any situation, but not as objects; they are interesting only on account of the character they express, the irriguous appearance which they give to the whole.

The full tide of a large river has more force than activity, and seems too unwieldy to allow of very quick transitions. But in a rill, the agility of its motion accounts for every caprice: frequent windings disguise its insignificance; short turnings show its vivacity; sudden changes in the breadth are a species of its variety; and however fantastically the channel may be wreathed, contracted, and widened, it still appears to be natural. We find an amusement in tracing the little stream through all the intricacies of its course, and in seeing it force a passage through a narrow strait, expatiate on every opportunity, struggle with obstructions, and puzzle out its way. A rivulet, which is the mean betwixt a river and a rill, partakes of the character of both: it is not licensed to the extravagance of the one, nor under the same restraints as the other: it may have more frequent bends than the river, longer reaches than a rill: the breadth of a stream determines whether the principal beauty results from extent or from variety.

The murmurs of a rill are amongst the most pleasing circumstances which attend it. If the bed of the stream be rough, mere declivity will occasion a constant rippling noise: when the current drops down a descent, though but of a few inches, or forcibly bubbles up from a little hollow, it has a deep gurgling tone, not uniformly continued, but incessantly repeated, and therefore more engaging than any. The flattest of all, is that sound rather of the splashing than the fall of water, which an even gentle slope, or a tame obstruction, will produce: this is less pleasing than the others; but none should be entirely excluded: all in their turns are agreeable; and the choice of them is much in our power. By observing their causes, we may often find the means to strengthen, to weaken, or to change them; and the addition or removal of a single stone, or a few pebbles, will sometimes be sufficient for the purpose.

8
Of Cascades. A rill cannot pretend to any sound beyond that of a little water-fall: the roar of a cascade belongs only to larger streams; but it may be produced by a rivulet to a considerable degree, and attempts to do more have generally been unsuccessful. A vain ambition to imitate nature in her great extravagancies betrays the weakness of art. Though a noble river, throwing itself headlong down a precipice, be an object truly magnificent, it must however be confessed, that in a single sheet of water there is a formality which its vastness alone can cure. But the height, not the breadth, is the wonder: when it falls no more than a few feet, the regularity prevails; and its extent only serves to expose the vanity of affecting the style of a cataract in an artificial cascade. It is less exceptionable if divided into several parts: for then each separate part may be wide enough for its depth; and in the whole, variety, not greatness, will be the predominant character. But

a structure of rough, large, detached stones, cannot easily be contrived of strength sufficient to support a great weight of water: it is sometimes from necessity almost smooth and uniform, and then it loses much of its effect. Several little falls in succession are preferable to one great cascade which in figure or in motion approaches to regularity.

When greatness is thus reduced to number, and length becomes of more importance than breadth, a rivulet vies with a river; and it more frequently runs in a continued declivity, which is very favourable to such a succession of falls. Half the expence and labour which are sometimes bestowed on a river, to give it at the best a forced precipitancy in one spot only, would animate a rivulet through the whole of its course. And, after all, the most interesting circumstance in falling waters is their animation. A great cascade fills us with surprise: but all surprise must cease; and the motion, the agitation, the rage, the froth, and the variety of the water, are finally the objects which engage the attention: for these a rivulet is sufficient; and they may there be produced without that appearance of effort which raises a suspicion of art.

To obviate such a suspicion, it may be sometimes expedient to begin the descent out of sight; for the beginning is the difficulty: if that be concealed, the subsequent falls seem but a consequence of the agitation which characterises the water at its first appearance; and the imagination is, at the same time, let loose to give ideal extent to the cascades. When a stream issues from a wood, such management will have a great effect: the bends of its course in an open exposure may afford frequent opportunities for it; and sometimes a low broad bridge may furnish the occasion: a little fall hid under the arch will create a disorder; in consequence of which, a greater cascade below will appear very natural.

IV. ROCKS. Rocks are themselves too vast and too stubborn to submit to our controul; but by the addition or removal of appendages which we can command, parts may be shown or concealed, and the characters with their impressions may be weakened or enforced: to adapt the accompaniments accordingly, is the utmost ambition of art when rocks are the subject.

Their most distinguished characters are, *dignity*, *terror*, and *fancy*: the expressions of all are constantly wild: and sometimes a rocky scene is only wild, without pretensions to any particular character.

Rills, rivulets, and cascades, abound among rocks: they are natural to the scene; and such scenes commonly require every accompaniment which can be procured for them. Mere rocks, unless they are peculiarly adapted to certain impressions, though they may surprise, cannot be long engaging, if the rigour of their character be not softened by circumstances which may belong either to these or to more cultivated spots: and when the dreariness is extreme, little streams and water-falls are of themselves insufficient for the purpose; an intermixture of vegetation is also necessary, and on some occasions even marks of inhabitants are proper.

Large clefts, sloping or precipitous, with a dale at bottom, furnish scenes of the wildest nature. In such spots, verdure alone will give some relief to the dreariness of the scene; and shrubs or bushes, without trees,

Rocks.

9
Of Rocks.

Rocks.

Ibid.

are a sufficiency of wood: the thickets may also be extended by the creeping plants, such as pyracantha, vines, and ivy, to wind up the sides or cluster on the tops of the rocks. And to this vegetation may be added some symptoms of inhabitants, but they must be slight and few; the use of them is only to cheer, not to destroy, the solitude of the place; and such therefore should be chosen as are sometimes found in situations retired from public resort; a cottage may be lonely, but it must not here seem ruinous and neglected; it should be tight and warm, with every mark of comfort about it, to which its position in some sheltered recess may greatly contribute. A cavity also in the rocks, rendered easy of access, improved to a degree of convenience, and maintained in a certain state of preservation, will suggest similar ideas of protection from the bitterest inclemencies of the sky, and even of occasional refreshment and repose. But we may venture still further; a mill is of necessity often built at some distance from the town which it supplies; and here it would at the same time apply the water to a use, and increase its agitation. The dale may besides be made the haunt of those animals, such as goats, which are sometimes wild, and sometimes domestic; and which accidentally appearing, will divert the mind from the sensations natural to the scene, but not agreeable if continued long without interruption. These and such other expedients will approximate the severest retreat to the habitations of men, and convert the appearance of a perpetual banishment into that of a temporary retirement from society.

But too strong a force on the nature of the place always fails. A winding path, which appears to be worn, not cut, has more effect than a high road, all artificial and level, which is too weak to overbear, and yet contradicts, the general idea. The objects therefore to be introduced must be those which hold a mean between solitude and population; and the inclination of that choice towards either extreme, should be directed by the degree of wildness which prevails; for tho' that runs sometimes to an excess which requires correction, at other times it wants encouragement, and at all times it ought to be preserved: it is the predominant character of rocks, which mixes with every other, and to which all the appendages must be accommodated; and they may be applied so as greatly to increase it: a licentious irregularity of wood and of ground, and a fantastic conduct of the streams, neither of which would be tolerated in the midst of cultivation, become and improve romantic rocky spots; even buildings, partly by their style, but still more by their position, in strange, difficult, or dangerous situations, distinguish and aggravate the native extravagancies of the scene.

Greatness is a chief ingredient in the character of *dignity*, with less of wildness than in any other. The effect here depends more upon amplitude of surface, than variety of forms. The parts, therefore, must be large: if the rocks are only high, they are but stupendous, not majestic: breadth is equally essential to their greatness; and every slender, every grotesque shape, is excluded. Art may interpose to show these large parts to the eye, and magnify them to the imagination, by taking away thickets which stretch quite across the rocks, so as to disguise their dimensions; or by filling with wood the small intervals between them,

N^o 134.

and thus, by concealing the want, preserving the appearance of continuation. When rocks retire from the eye down a gradual declivity, we can, by raising the upper ground, deepen the fall, lengthen the perspective, and give both height and extent to those at a distance: this effect may be still increased by covering that upper ground with a thicket, which shall cease, or be lowered, as it descends. A thicket, on other occasions, makes the rocks which rise out of it seem larger than they are. If they stand upon a bank over-spread with shrubs, their beginning is at the least uncertain; and the presumption is, that they start from the bottom. Another use of this brushy underwood is to conceal the fragments and rubbish which have fallen from the sides and the brow, and which are often unsightly. Rocks are seldom remarkable for the elegance of their forms; they are too vast, and too rude, to pretend to delicacy: but their shapes are often agreeable; and we can affect those shapes to a certain degree, at least we can cover many blemishes in them, by conducting the growth of shrubby and creeping plants about them.

For all these purposes mere underwood suffices: but for greater effects larger trees are requisite: they are worthy of the scene; and not only improvements, but accessions to its grandeur: we are used to rank them among the noblest objects of nature; and when we see that they cannot aspire to the midway of the heights around them, the rocks are raised by the comparison. A single tree is, therefore, often preferable to a clump: the size, though really less, is more remarkable: and clumps are besides generally exceptionable in a very wild spot, from the suspicion of art which attends them; but a wood is free from that suspicion, and its own character of greatness recommends it to every scene of magnificence.

On the same principle, all possible consideration should be given to the streams. No number of little rills are equal to one broad river; and in the principal current, some varieties may be sacrificed to importance: but a degree of strength should always be preserved: the water, though it needs not be furious, should not be dull; for dignity, when most serene, is not languid; and space will hardly atone for want of animation.

This character does not exclude marks of inhabitants, though it never requires them to tame its wildness: and without inviting, it occasionally admits an intermixture of vegetation. It even allows of buildings intended only to decorate the scene: but they must be adequate to it, both in size and in character. And if cultivation is introduced, that too should be conformable to the rest; not a single narrow patch cribbed out of the waste; but the confines of a country shelving into the vale, and suggesting the idea of extent: nothing trivial ought to find admittance. But, on the other hand, no extravagance required to support it: strange shapes in extraordinary positions, enormous weights unaccountably sustained, trees rooted in the sides, and torrents raging at the foot of the rocks, are at the best needless excesses. There is a temperance in dignity, which is rather hurt by a wanton violence on the common order of nature.

The terrors of a scene in nature are like those of a dramatic representation: they give an alarm; but the sensations are agreeable, so long as they are kept to such

Rocks.

Rocks.

Ibid.

such as are allied only to terror, unmixed with any that are horrible and disgusting. Art may therefore be used to heighten them, to display the objects which are distinguished by greatness, to improve the circumstances which denote force, to mark those which intimate danger, and to blend with all here and there a cast of melancholy.

Greatness is as essential to the character of *terror* as to that of dignity: vast efforts in little objects are but ridiculous; nor can force be supposed upon trifles incapable of resistance. On the other hand, it must be allowed, that exertion and violence supply some want of space. A rock wonderfully supported, or threatening to fall, acquires a greatness from its situation, which it has not in dimensions; so circumstanced, the size appears to be monstrous: a torrent has a consequence which a placid river of equal breadth cannot pretend to: and a tree, which would be inconsiderable in the natural soil, becomes important when it bursts forth from a rock.

Such circumstances should be always industriously sought for. It may be worth while to cut down several trees, in order to exhibit one apparently rooted in the stone. By the removal perhaps of only a little brushwood, the alarming disposition of a rock, strangely undermined, rivetted, or suspended, may be shown; and if there be any soil above its brow, some trees planted there, and impending over it, will make the object still more extraordinary. As to the streams, great alterations may generally be made in them: and therefore it is of use to ascertain the species proper to each scene, because it is in our power to enlarge or contract their dimensions; to accelerate or retard their rapidity; to form, increase, or take away obstructions; and always to improve, often to change, their characters.

Inhabitants furnish frequent opportunities to strengthen the appearances of force, by giving intimations of danger. A house placed at the edge of a precipice, any building on the pinnacle of a craig, makes that situation seem formidable, which might otherwise have been unnoticed: a steep, in itself not very remarkable, becomes alarming, when a path is carried ascent up the side: a rail on the brow of a perpendicular fall, shows that the height is frequented and dangerous: and a common foot-bridge thrown over a cleft between rocks has a still stronger effect. In all these instances, the imagination immediately transports the spectator to the spot, and suggests the idea of looking down such a depth: in the last, that depth is a chasm, and the situation is directly over it.

In other instances, exertion and danger seem to attend the occupations of the inhabitants:

—Half way down

Hangs one that gathers samphire; dreadful trade!

is a circumstance chosen by the great poet of nature, to aggravate the terrors of the scene he describes.

The different species of rocks often meet in the same place, and compose a noble scene, which is not distinguished by any particular character: it is only when one eminently prevails, that it deserves such a preference as to exclude every other. Sometimes a spot, remarkable for nothing but its wildness, is highly romantic: and when this wildness rises to *fancy*; when the most singular, the most opposite forms and combi-

nations are thrown together; then a mixture also of several characters adds to the number of instances which there concur to display the inexhaustible variety of nature.

So much variety, so much fancy, are seldom found within the same extent as in Dovedale †. It is about two miles in length, a deep, narrow, hollow valley: both the sides are of rock; and the Dove in its passage between them is perpetually changing its course, its motion, and appearance. It is never less than ten, nor so much as twenty yards wide, and generally about four feet deep; but transparent to the bottom, except when it is covered with a foam of the purest white, under water-falls, which are perfectly lucid. These are very numerous, but very different. In some places they stretch straight across, or ascent the stream: in others, they are only partial: and the water either dashes against the stones, and leaps over them, or, pouring along a steep, rebounds upon those below; sometimes it rushes through the several openings between them; sometimes it drops gently down; and at other times it is driven back by the obstruction, and turns into an eddy. In one particular spot, the valley almost closing, leaves hardly a passage for the river, which pent up, and struggling for a vent, rages, and roars, and foams, till it has extricated itself from the confinement. In other parts, the stream, though never languid, is often gentle; flows round a little desert island, glides between bits of bulrushes, disperses itself among tufts of grass or of moss, bubbles about a water-dock, or plays with the slender threads of aquatic plants which float upon the surface. The rocks all along the dale vary as often in their structure as the stream in its motion. In one place, an extended surface gradually diminishes from a broad base almost to an edge; in another, a heavy top hanging forwards, overshadows all beneath: sometimes many different shapes are confusedly tumbled together; and sometimes they are broken into slender sharp pinnacles, which rise upright, often two or three together, and often in more numerous clusters. On this side of the dale, they are universally bare; on the other, they are intermixed with wood; and the vast height of both the sides, with the narrowness of the interval between them, produces a further variety: for whenever the sun shines from behind the one, the form of it is distinctly and completely cast upon the other; the rugged surface on which it falls diversifies the tints; and a strong reflected light often glares on the edge of the deepest shadow. The rocks never continue long in the same figure or situation, and are very much separated from each other: sometimes they form the sides of the valley, in precipices, in steeps, or in stages; sometimes they seem to rise in the bottom, and lean back against the hill; and sometimes they stand out quite detached, heaving up in cumbrous piles, or starting into conical shapes, like vast spars, 100 feet high; some are firm and solid throughout; some are cracked; and some, split and undermined, are wonderfully upheld by fragments apparently unequal to the weight they sustain. One is placed before, one over another; and one fills at some distance behind an interval between two. The changes in their disposition are infinite; every step produces some new combination; they are continually crossing, advancing, and re-

Rocks.

† Near Ashbourne in Derbyshire.

Rocks.

Ibid.

ting: the breadth of the valley is never the same 40 yards together: at the narrow pass which has been mentioned, the rocks almost meet at the top, and the sky is seen as through a chink between them: just by this gloomy abyss, is a wider opening, more light, more verdure, more cheerfulness, than any where else in the dale. Nor are the forms and the situations of the rocks their only variety: many of them are perforated by large natural cavities, some of which open to the sky, some terminate in dark recesses, and through some are to be seen several more uncouth arches, and rude pillars, all detached, and retiring beyond each other, with the light shining in between them, till a rock far behind them closes the perspective: the noise of the cascades in the river echoes amongst them; the water may often be heard at the same time gurgling near, and roaring at a distance; but no other sounds disturb the silence of the spot: the only trace of men is a blind path, but lightly and but seldom trodden, by those whom curiosity leads to see the wonders they have been told of Dovedale. It seems indeed a fitter haunt for more ideal beings: the whole has the air of enchantment. The perpetual shifting of the scenes; the quick transitions, the total changes; then the forms all around, grotesque as chance can cast, wild as nature can produce, and various as imagination can invent; the force which seems to have been exerted to place some of the rocks where they are now fixed immovable, the magic by which others appear still to be suspended; the dark caverns, the illuminated recesses, the fleeting shadows, and the gleams of light glancing on the sides, or trembling on the stream; and the loneliness and the stillness of the place, all crowding together on the mind, almost realize the ideas which naturally present themselves in this region of romance and of fancy.

The solitude of such a scene is agreeable, on account of the endless entertainment which its variety affords, and in the contemplation of which both the eye and the mind are delighted to indulge: marks of inhabitants and cultivation would disturb that solitude; and ornamental buildings are too artificial in a place so absolutely free from restraint. The only accompaniments proper for it are wood and water; and by these sometimes improvements may be made. When two rocks similar in shape and position are near together, by skirting one of them with wood, while the other is left bare, a material distinction is established between them: if the streams be throughout of one character, it is in our power, and should be our aim, to introduce another. Variety is the peculiar property of the spot, and every accession to it is a valuable acquisition. On the same principle, endeavours should be used not only to multiply, but to aggravate differences, and to increase distinctions into contrasts: but the subject will impose a caution against attempting too much. Art must almost despair of improving a scene, where nature seems to have exerted her influence.

*Practical
Treatise on
Planting
and Gardening,
p. 593,
&c.*

§ 2. Of FACTITIOUS ACCOMPANIMENTS.

THESE consist of Fences, Walks, Roads, Bridges, Seats, and Buildings.

“ I. The FENCE, where the place is large, becomes

necessary: yet the eye dislikes constraint. Our ideas of liberty carry us beyond our own species: the imagination feels a dislike in seeing even the brute creation in a state of confinement. The birds wafting themselves from wood to grove are objects of delight; and the hare appears to enjoy a degree of happiness unknown to the barred flock. Besides, a tall fence frequently hides from the sight objects the most pleasing; not only the flocks and herds themselves, but the surface they graze upon. These considerations have brought the unseen fence into general use.

This species of barrier it must be allowed incurs a degree of deception, which can scarcely be warranted upon any other occasion. In this instance, however, it is a species of fraud which we observe in nature's practice: how often have we seen two distinct herds feeding to appearance in the same extended meadow; until coming abruptly upon a deep sunk rivulet, or an unfordable river, we discover the deception.

Besides the sunk fence, another sort of unseen barrier may be made, though by no means equal to that, especially if near the eye. This is constructed of paling, painted of the invisible green. If the colour of the back-ground were permanent, and that of the paling made exactly to correspond with it, the deception would at a distance be complete; but back-grounds in general changing with the season, this kind of fence is the less eligible.

Clumps and patches of woodiness scattered promiscuously on either side of an unseen winding fence, assist very much in doing away the idea of constraint. For by this means

The wand'ring flocks that browse between the shades,
Seem off to pass their bounds, the dubious eye
Decides not if they crop the mead or lawn. MASON.

“ II. The WALK, in extensive grounds is as necessary as the fence. The beauties of the place are disclosed that they may be seen; and it is the office of the walk to lead the eye from view to view; in order that whilst the tone of health is preserved by the favourite exercise of nature, the mind may be thrown into unison by the harmony of the surrounding objects.

The direction of the walk must be guided by the points of view to which it leads, and the nature of the ground it passes over: it ought to be made subservient to the natural impediments (the ground, wood, and water) which fall in its way, without appearing to have any direction of its own. It can seldom run with propriety any distance in a straight line; a thing which rarely occurs in a natural walk. The paths of the Negroes and the Indians are always crooked; and those of the brute creation are very similar. Mr Mason's description of this path of nature is happily conceived.

The peasant driving through each shadowy lane
His team, that bends beneath th' incumbent weight
Of laughing Ceres, marks it with his wheel;
At night and morn, the milk-maid's careless step
Has, through yon pasture green, from stile to stile
Imprest a kindred curve: the scudding hare
Draws to her dew-scented seat, o'er thymy heaths,
A path as gently waving. *Eng. Gard. v. 60.*

“ III. The ROAD may be a thing of necessity, as an approach to the mansion; or a matter of amusement only, as a drive or a ride, from which the grounds and the surrounding country may be seen to advantage.

It

ge, &c. It should be the study of the artist to make the same road answer, as far as may be, the two-fold purpose.

Ibid. The road and the walk are subject to the same rule of nature and use. The direction ought to be natural and easy, and adapted to the purpose intended. A road of necessity ought to be straighter than one of mere convenience: in this, recreation is the predominant idea; in that, utility. But even in this the direct line may be dispensed with. The natural roads upon heaths and open downs, and the grassy glades and green roads across forests and extensive wastes, are proper subjects to be studied.

"IV. The BRIDGE should never be seen where it is not wanted: a useless bridge is a deception; deceptions are frauds; and fraud is always hateful, unless when practised to avert some greater evil. A bridge without water is an absurdity; and half an one stuck up as an eye-trap is a paltry trick, which, though it may strike the stranger, cannot fail of disgusting when the fraud is found out.

In low situations, and wherever water abounds, bridges become useful, and are therefore pleasing objects: they are looked for; and ought to appear not as objects of ornament only, but likewise as matters of utility. The walk or the road therefore ought to be directed in such a manner as to cross the water at the point in which the bridge will appear to the greatest advantage.

In the construction of bridges also, regard must be had to ornament and utility. A bridge is an artificial production, and as such it ought to appear. It ranks among the noblest of human inventions; the ship and the fortrefs alone excel it. Simplicity and firmness are the leading principles in its construction. Mr Wheatley's observation is just when he says, "The single wooden arch, now much in fashion, seems to me generally misapplied. Elevated without occasion so much above, it is totally detached from the river; it is often seen straddling in the air, without a glimpse of water to account for it; and the ostentation of it as an ornamental object, diverts all that train of ideas which its use as a communication might suggest." But we beg leave to differ from this ingenious writer when he tells us, "that it is spoiled if adorned; it is disfigured if only painted of any other than a dusky colour." In a rustic scene, where Nature wears her own coarse garb, "the vulgar foot bridge of planks only guarded on one hand by a common rail, and supported by a few ordinary piles," may be in character; but amidst a display of ornamented nature, a contrivance of that kind would appear mean and paltry; and would be an affectation of simplicity rather than the lovely attribute itself. In cultivated scenes, the bridge ought to receive the ornaments which the laws of architectural taste allow; and the more polished the situation, the higher should be the style and finishings.

"V. SEATS have a two-fold use; they are useful as places of rest and conversation, and as guides to the points of view in which the beauties of the surrounding scene are disclosed. Every point of view should be marked with a seat; and, speaking generally, no seat ought to appear but in some favourable point of

view. This rule may not be invariable, but it ought seldom to be deviated from.

In the ruder scenes of neglected nature, the simple trunk, rough from the woodman's hands, and the butts or stools of rooted trees, without any other marks of tools upon them than those of the saw which severed them from their stems, are seats in character; and in romantic or reclusive situations, the cave or the grotto are admissible. But wherever human design has been executed upon the natural objects of the place, the seat and every other artificial accompaniment ought to be in unison; and whether the bench or the alcove be chosen, it ought to be formed and finished in such a manner as to unite with the wood, the lawn, and the walk, which lie around it.

The colour of seats should likewise be suited to situations: where uncultivated nature prevails, the natural brown of the wood itself ought not to be altered; but where the rural art presides, white or stone colour has a much better effect."

"VI. BUILDINGS probably were first introduced into gardens merely for convenience, to afford refuge from a sudden shower, and shelter against the wind; or, at the most, to be seats for a party; or for retirement. They have since been converted into objects, and now the original use is too often forgotten in the greater purposes to which they are applied: they are considered as objects only; the inside is totally neglected, and a pompous edifice frequently wants a room barely comfortable. Sometimes the pride of making a lavish display to a visitor without any regard to the owner's enjoyments, and sometimes too scrupulous attention to the style of the structure, occasions a poverty and dullness within, which deprive the buildings of part of their utility. But in a garden they ought to be considered both as beautiful objects and as agreeable retreats: if a character becomes them, it is that of the scene they belong to; not that of their primitive application. A Grecian temple, or Gothic church may adorn spots where it would be affectation to preserve that solemnity within which is proper for places of devotion: they are not to be exact models, subjects only of curiosity or study: they are also seats: and such seats will be little frequented by the proprietor; his mind must generally be indisposed to so much simplicity, and so much gloom, in the midst of gaiety, richness, and variety.

But though the interior of buildings should not be disregarded, it is by their exterior that they become objects; and sometimes by the one, sometimes by the other, and sometimes by both, they are intitled to be considered as characters.

1. As objects, they are designed either to distinguish, or to break, or to adorn, the scenes to which they are applied. ¹⁰Of buildings intended for objects.

The differences between one wood, one lawn, one piece of water, and another, are not always very apparent; the several parts of a garden would, therefore, often seem similar, if they were not distinguished by buildings: but these are so observable, so obvious at a glance, so easily retained in the memory, they mark the spots where they are placed with so much strength, they attract the relation of all around with so much

Buildings.

power, that parts thus distinguished can never be confounded together. Yet it by no means follows, that therefore every scene must have its edifice: the want of one is sometimes a variety; and other circumstances are often sufficiently characteristic: it is only when these too nearly agree, that we must have recourse to buildings for differences: we can introduce, exhibit, or contrast them as we please: the most striking object is thereby made a mark of distinction; and the force of this first impression prevents our observing the points of resemblance.

Observ. on
Mod. Gard-
ening.

The uniformity of a view may be broken by similar means, and on the same principle: when a wide heath, a dreary moor, or a continued plain, is in prospect, objects which catch the eye supply the want of variety: none are so effectual for this purpose as buildings. Plantations or water can have no very sensible effect, unless they are large or numerous, and almost change the character of the scene: but a small single building diverts the attention at once from the sameness of the extent; which it breaks, but does not divide; and diversifies, without altering, its nature. The design, however, must not be apparent. The merit of a cottage applied to this purpose, consists in its being free from the suspicion: and a few trees near it will both enlarge the object, and account for its position. Ruins are a hackneyed device immediately detected, unless their style be singular, or their dimensions extraordinary. The semblance of an ancient British monument might be adapted to the same end, with little trouble, and great success. The materials might be brick, or even timber plastered over, if stone could not easily be procured: whatever they were, the fallacy would not be discernible; it is an object to be seen at a distance, rude, and large, and in character agreeable to a wild open view. But no building ought to be introduced, which may not in reality belong to such a situation: no Grecian temples, no Turkish mosques, no Egyptian obelisks or pyramids; none imported from foreign countries, and unusual here. The apparent artifice would destroy an effect, which is so nice as to be weakened, if objects proper to produce it are displayed with too much ostentation; if they seem to be contrivances, not accidents; and the advantage of their position appear to be more laboured than natural.

But in a garden, where objects are intended only to adorn, every species of architecture may be admitted, from the Grecian down to the Chinese; and the choice is so free, that the mischief most to be apprehended is an abuse of this latitude in the multiplicity of buildings. Few scenes can bear more than two or three: in some, a single one has a greater effect than any number: and a careless glimpse, here and there, of such as belong immediately to different parts, frequently enliven the landscape with more spirit than those which are industriously shown. If the effect of a partial sight, or a distant view, were more attended to, many scenes might be filled, without being crowded; a greater number of buildings would be tolerated, when they seemed to be casual, not forced; and the animation, and the richness of the objects, might be had without pretence or display.

Too fond an ostentation of buildings, even of these

which are principal, is a common error; and when all is done, they are not always shown to the greatest advantage. Though their symmetry and their beauties ought in general to be distinctly and fully seen, yet an oblique is sometimes better than a direct view: and they are often less agreeable objects when entire, than when a part is covered, or their extent is interrupted; when they are bosomed in wood, as well as backed by it; or appear between the stems of trees which rise before or above them: thus thrown into perspective, thus grouped and accompanied, they may be as important as if they were quite exposed, and are frequently more picturesque and beautiful.

But a still greater advantage arises from this management, in connecting them with the scene: they are considerable, and different from all around them; inclined therefore to separate from the rest; and yet they are sometimes still more detached by the pains taken to exhibit them: that very importance which is the cause of the distinction ought to be a reason for guarding against the independence to which it is naturally prone, and by which an object, which ought to be a part of the whole, is reduced to a mere individual. An elevated is generally a noble situation. When it is a point or a pinnacle, the structure may be a continuation of the ascent; and on many occasions, some parts of the building may descend lower than others, and multiply the appearances of connection: but an edifice in the midst of an extended ridge, commonly seems naked alone, and imposed upon the brow, not joined to it. If wood, to accompany it, will not grow there, it had better be brought a little way down the declivity; and then all behind, above, and about it, are so many points of contact, by which it is incorporated into the landscape.

Accompaniments are important to a building; but they lose much of their effect when they do not appear to be casual. A little mount just large enough for it; a small piece of water below, of no other use than to reflect it; and a plantation close behind, evidently placed there only to give it relief; are as artificial as the structure itself, and alienate it from the scene of nature into which it is introduced, and to which it ought to be reconciled. These appendages therefore should be so disposed, and so connected with the adjacent parts, as to answer other purposes, though applicable to this: that they may be bonds of union, not marks of difference; and that the situation may appear to have been chosen at the most, not made, for the building.

In the choice of a situation, that which shows the building best ought generally to be preferred: eminence, relief, and every other advantage which can be, ought to be given to an object of so much consideration: they are for the most part desirable; sometimes necessary; and exceptionable only when, instead of rising out of the scene, they are forced into it, and a contrivance to procure them at any rate is avowed without any disguise. There are, however, occasions, in which the most tempting advantages of situation must be waved; the general composition may forbid a building in one spot, or require it in another; at other times, the interest of the particular groupe it belongs to, may exact a sacrifice of the opportunities to exhibit

Buildings.
Ibid.

exhibit its beauties and importance: and at all times, the pretensions of every individual object must give way to the greater effect of the whole.

II
of those
expressive
of charac-
ter.

2. The same structure which adorns as an object, may also be expressive as a *character*. Where the former is not wanted, the latter may be desirable: or it may be weak for one purpose, and strong for the other; it may be grave, or gay; magnificent, or simple; and, according to its style, may or may not be agreeable to the place it is applied to. But mere consistency is not all the merit which buildings can claim: their characters are sometimes strong enough to *determine, improve, or correct*, that of the scene: and they are so conspicuous, and so distinguished, that whatever force they have is immediately and sensibly felt. They are fit therefore to make a first impression; and when a scene is but faintly characterised, they give at once a cast which spreads over the whole, and which the weaker parts concur to support, though perhaps they were not able to produce it.

Nor do they stop at fixing an uncertainty, or removing a doubt; they raise and enforce a character already marked: a temple adds dignity to the noblest, a cottage simplicity to the most rural, scenes; the lightness of a spire, the airiness of an open rotunda, the splendor of a continued colonnade, are less ornamental than expressive; others improve cheerfulness into gaiety, gloom into solemnity, and richness into profusion: a retired spot, which might have been passed unobserved, is noticed for its tranquillity, as soon as it is appropriated by some structure to retreat; and the most unfrequented place seems less solitary than one which appears to have been the haunt of a single individual, or even of a sequestered family, and is marked by a lonely dwelling, or the remains of a deserted habitation.

The means are the same, the application of them only is different, when buildings are used to correct the character of the scene; to enliven its dulness, mitigate its gloom, or to check its extravagance; and, on a variety of occasions, to soften, to aggravate, or to counteract, particular circumstances attending it. But care must be taken that they do not contradict too strongly the prevailing idea: they may lessen the dreariness of a waste, but they cannot give it amenity; they may abate horrors, but they will never convert them into graces; they may make a tame scene agreeable, and even interesting, not romantic; or turn solemnity into cheerfulness, but not into gaiety. In these, and in many other instances, they correct the character, by giving it an inclination towards a better, which is not very different; but they can hardly alter it entirely: when they are totally inconsistent with it, they are at the best nugatory.

The great effects which have been ascribed to buildings do not depend upon those trivial ornaments and appendages which are often too much relied on; such as the furniture of a hermitage, painted glass in a Gothic church, and sculpture about a Grecian temple; grotesque or bacchanalian figures to denote gaiety, and death's-heads to signify melancholy. Such devices are only descriptive, not expressive, of character; and must not be substituted in the stead of those superior properties, the want of which they acknowledge, but do not supply. They besides often

require time to trace their meaning, and to see their application; but the peculiar excellence of buildings is, that their effects are instantaneous, and therefore the impressions they make are forcible. In order to produce such effects, the general style of the structure, and its position, are the principal considerations: either of them will sometimes be strongly characteristic alone; united, their powers are very great; and both are so important, that if they do not concur, at least they must not contradict one another.

Every branch of architecture furnishes, on different occasions, objects proper for a garden; and there is no restraint on our selection, provided it be conformable to the style of the scene, proportioned to its extent, and agreeable to its character.

The choice of situations is also very free. A hermitage, indeed, must not be close to a road; but whether it be exposed to view on the side of a mountain, or concealed in the depth of a wood, is almost a matter of indifference; that it is at a distance from public resort is sufficient. A castle must not be sunk in a bottom; but that it should stand on the utmost pinnacle of a hill, is not necessary: on a lower knoll, and backed by the rise, it may appear to greater advantage as an object, and be much more important to the general composition. Many buildings, which from their splendor best become an open exposure, will yet be sometimes not ill bestowed on a more sequestered spot, either to characterise or adorn it; and others, for which a solitary would in general be preferred to an eminent situation, may occasionally be objects in very conspicuous positions. A Grecian temple, from its peculiar grace and dignity, deserves every distinction; it may, however, in the depth of a wood, be so circumstanced, that the want of those advantages to which it seems intitled will not be regretted. A happier situation cannot be devised, than that of the temple of Pan on the south lodge on Enfield chace. It is of the usual oblong form, encompassed by a colonnade; in dimensions, and in style, it is equal to a most extensive landscape: and yet by the antique and rustic air of its Doric columns without bases; by the chastity of its little ornaments, a crook, a pipe, and a scrip, and those only over the doors; and by the simplicity of the whole both within and without; it is adapted with so much propriety to the thickets which conceal it from the view, that no one can wish it to be brought forward, who is sensible to the charms of the Arcadian scene which this building alone has created. On the other hand, a very spacious field, or sheep-walk, will not be disgraced by a farm-house, a cottage, or a Dutch barn; nor will they, though small and familiar, appear to be inconsiderable or insignificant objects. Numberless other instances might be adduced to prove the impossibility of restraining particular buildings to particular situations, upon any general principles: the variety in their forms is hardly greater than in their application. Only let not their uses be disguised, as is often absurdly attempted with the humbler kinds. "A barn * dressed up in the habit of a country-church, or a farm-house figuring away in the fierceness of a castle, are ridiculous deceptions. A landscape daubed upon a board, and a wooden steeple stuck up in a wood, are beneath contempt."

Temples, those favourite and most costly objects in gardens, too generally merit censure for their inutility, their

Buildings.

II
Species and
situations
of build-
ings.* Planting
and Gar-
dining,
p. 593.

Buildings.

their profusion, or the impropriety of their purpose. "Whether they be dedicated to Bacchus, Venus, Priapus, or any other demon of debauchery, they are in this age, enlightened with regard to theological and scientific knowledge, equally absurd. Architecture, in this part of its sphere, may more nobly, and with greater beauty and effect, be exercised upon a chapel, a mausoleum, a monument, judiciously disposed among the natural ornaments. The late Sir William Harbord, has given us a model of the first kind, at Gunton, in Norfolk; the parish-church standing in his park, and being an old unsightly building, he had it taken down, and a beautiful temple, under the direction of the Adams's erected upon its site for the same sacred purpose:—The mausoleum at Castle-Howard, in Yorkshire, the seat of the earl of Carlisle, is a noble structure:—And as an instance of the last sort, may be mentioned the Temple of Concord and Victory at Stowe, erected to the memory of the great lord Chat-ham and his glorious war; a beautiful monumental building, suited to the greatness of the occasion."

To the great variety above mentioned must be added, Mr Wheatley observes, the many changes which may be made by the means of ruins. They are a class by themselves, beautiful as objects, expressive as characters, and peculiarly calculated to connect with appendages into elegant groupes. They may be accommodated with ease to irregularity of ground, and their disorder is improved by it. They may be intimately blended with trees and thickets; and the interruption is an advantage: for imperfection and obscurity are their properties; and to carry the imagination to something greater than is seen, is their effect. They may for any of these purposes be separated into detached pieces; contiguity is not necessary, nor even the appearance of it, if the relation be preserved; but straggling ruins have a bad effect, when the several parts are equally considerable. There should be one large mass to raise an idea of greatness, to attract the others about it, and to be a common centre of union to all: the smaller pieces then mark the original dimensions of one extensive structure; and no longer appear to be the remains of several little buildings.

Observations
on Mod.
Gardening.

All remains excite an inquiry into the former state of the edifice, and fix the mind in a contemplation of the use it was applied to; besides the characters expressed by their style and position, they suggest ideas which would not arise from the buildings if entire. The purposes of many have ceased: an abbey, or a castle, if complete, can now be no more than a dwelling; the memory of the times, and of the manners to which they are adapted, is preserved only in history, and in ruins; and certain sensations of regret, of veneration, or compassion, attend the recollection. Nor are these confined to the remains of buildings which are now in disuse: those of an old mansion raise reflections on the domestic comforts once enjoyed, and the ancient hospitality which reigned there. Whatever building we see in decay, we naturally contrast its present to its former state, and delight to ruminate on the comparison. It is true that such effects properly belong to real ruins; they are however produced in a certain degree by those which are fictitious: the impressions are not so strong, but they are exactly similar; and the representation, though it does not

present facts to the memory, yet suggests subjects to the imagination. But, in order to affect the fancy, the supposed original design should be clear, the use obvious, and the form easy to be traced: no fragments should be hazarded without a precise meaning, and an evident connection; none should be perplexed in their construction, or uncertain as to their application. Conjectures about the form, raise doubts about the existence of the ancient structure: the mind must not be allowed to hesitate; it must be hurried away from examining into the reality, by the exactness and the force of the resemblance.

In the ruins of Tintern abbey †, the original construction of the church is perfectly marked; and it is principally from this circumstance that they are celebrated as a subject of curiosity and contemplation. The walls are almost entire; the roof only is fallen in, but most of the columns which divided the aisles are still standing: of those which have dropped down, the bases remain, every one exactly in its place; and in the middle of the nave four lofty arches, which once supported the steeple, rise high in the air above all the rest, each reduced now to a narrow rim of stone, but completely preserving its form. The shapes even of the windows are little altered: but some of them are quite obscured, others partially shaded, by tufts of ivy; and those which are most clear, are edged with its slender tendrils, and lighter foliage, wreathing about the sides and the divisions: it winds round the pillars; it clings to the walls; and in one of the aisles clusters at the top in bunches, so thick and so large as to darken the space below. The other aisles, and the great nave, are exposed to the sky: the floor is entirely overspread with turf; and to keep it clear from weeds and bushes, is now its highest preservation. Monkish tomb-stones, and the monuments of benefactors long since forgotten, appear above the green sward; the bases of the pillars which have fallen, rise out of it; and maimed effigies, and sculpture worn with age and weather, Gothic capitals, carved cornices, and various fragments, are scattered about, or lie in heaps piled up together. Other shattered pieces, though disjointed and mouldering, still occupy their original places; and a stair-case much impaired, which led to a tower now no more, is suspended at a great height, uncovered and inaccessible. Nothing is perfect; but memorials of every part still subsist; all certain, but all in decay; and suggesting at once every idea which can occur in a seat of devotion, solitude, and desolation. Upon such models, fictitious ruins should be formed: and if any parts are entirely lost, they should be such as the imagination can easily supply from those which are still remaining. Distinct traces of the building which is supposed to have existed, are less liable to the suspicion of artifice, than an unmeaning heap of confusion. Precision is always satisfactory, but in the reality it is only agreeable; in the copy it is essential to the imitation.

A material circumstance to the truth of the imitation is, that the ruins appear to be very old. The idea is besides interesting in itself: a monument of antiquity is never seen with indifference; and a semblance of age may be given to the representation by the hue of the materials, the growth of ivy and other plants, and cracks

Buildings.

† Between
Chepstow
and Mon-
mouth.

Arts, &c
Ibid.

cracks and fragments seemingly occasioned rather by decay than by destruction. An appendage evidently more modern than the principal structure will sometimes corroborate the effect: the shed of a cottager amidst the remains of a temple, is a contrast both to the former and to the present state of the building; and a tree flourishing among ruins, shows the length of time they have lain neglected. No circumstance so forcibly marks the desolation of a spot once inhabited, as the prevalence of nature over it:

Campos ubi Troja fuit,

is a sentence which conveys a stronger idea of a city totally overthrown, than a description of its remains; but in a representation to the eye, some remains must appear; and then the perversion of them to an ordinary use, or an intermixture of a vigorous vegetation, intimates a settled despair of their restoration.

SECT. II. Principles of Selection and Arrangement in the Subjects of Gardening.

I. OF ART. In the lower classes of rural improvements, art should be seen as little as may be; and in the more negligent scenes of nature, every thing ought to appear as if it had been done by the general laws of nature, or had grown out of a series of fortuitous circumstances. But in the higher departments, art cannot be hid; and the appearance of design ought not to be excluded. A human production cannot be made perfectly natural; and held out as such it becomes an imposition. Our art lies in endeavouring to adapt the productions of nature to human taste and perceptions; and if much art be used, do not attempt to hide it. Art seldom fails to please when executed in a masterly manner: nay, it is frequently the design and execution, more than the production itself, that strikes us. It is the artifice, not the design, which ought to be avoided. It is the labour and not the art which ought to be concealed. The rural artist ought, therefore, upon every occasion, to endeavour to avoid labour; or, if indispensably necessary, to conceal it. No trace should be left to lead back the mind to the expensive toil. A mound raised, a mountain levelled, or a useless temple built, convey to the mind feelings equally disgusting.

13
Scenery.
Ibid.

II. PICTURESQUE BEAUTY. Tho' the aids of art are as essential to gardening, as education is to manners; yet art may do too much: she ought to be considered as the hand-maid, not as the mistress, of nature; and whether she be employed in carving a tree into the figure of an animal, or in shaping a view into the form of a picture, she is equally culpable. The nature of the place is sacred. Should this tend to landscape, from some principal point of view, assist nature and perfect it; provided this can be done without injuring the views from other points. But do not disfigure the natural features of the place:—do not sacrifice its native beauties, to the arbitrary laws of landscape painting.

Great Nature scorns controul; she will not bear
One beauty foreign to the spot or soil
She gives thee to adorn: 'Tis thine alone
To mend, not change her features.

MASON.

Nature scarcely knows the thing mankind call a landscape painting.

scapè. The landscape-painter seldom, if ever, finds it perfected to his hands;—some addition or alteration is almost always wanted. Every man who has made his observations upon natural scenery, knows that the misletoe of the oak occurs almost as often as a perfect natural landscape; and to attempt to make up artificial landscape upon every occasion is unnatural and absurd.

If, indeed, the eye were fixed in one point, the trees could be raised to their full height at command, and the sun be made to stand still,—the rural artist might work by the rules of light and shade, and compose his landscape by the painter's law. But, whilst the sun continues to pour forth its light impartially, and the trees to rise with slow progression, it would be ridiculous to attempt it. Let him rather seek out, imitate, and associate, such striking passages in nature as are immediately applicable to the place to be improved, with regard to rules of landscape, merely human;—and let him,

— in this and all

Be various, wild, and free, as Nature's self. MASON.
Instead of sacrificing the natural beauties of the place to one formal landscape, let every step disclose fresh charms unfought for.

III. OF CHARACTER. Character is very reconcilable with beauty; and, even when independent of it, has attracted so much regard, as to occasion several frivolous attempts to produce it: statues, inscriptions, and even paintings, history and mythology, and a variety of devices, have been introduced for this purpose. The heathen deities and heroes have therefore had their several places assigned to them in the woods and the lawns of a garden: natural cascades have been disfigured with river-gods, and columns erected only to receive quotations; the compartments of a summer-house have been filled with pictures of gambols and revels, as significant of gaiety; the cypress, because it was once used in funerals, has been thought peculiarly adapted to melancholy; and the decorations, the furniture, and the environs of a building, have been crowded with puerilities under pretence of propriety. All these devices are rather emblematical than expressive: they may be ingenious contrivances, and recal absent ideas to the recollection; but they make no immediate impression: for they must be examined, compared, perhaps explained, before the whole design of them is well understood. And tho' an allusion to a favourite or well known subject of history, of poetry, or of tradition, may now and then animate or dignify a scene; yet as the subject does not naturally belong to a garden, the allusion should not be principal: it should seem to have been suggested by the scene; a transitory image, which irresistibly occurred; not sought for, not laboured; and have the force of a metaphor, free from the detail of an allegory.

Another species of character arises from direct imitation; when a scene or an object, which has been celebrated in description, or is familiar in idea, is represented in a garden. Artificial ruins, lakes, and rivers, fall under this denomination. The air of a seat extended to a distance, and scenes calculated to raise ideas of Arcadian elegance or of rural simplicity, with many more which have been occasionally mentioned or will obviously

Wheatley's
Observations.

14
Of emblematical
characters.

15

Of imitative characters.

Character.

obviously occur, may be ranked in this class. They are all representations. But the materials, the dimensions, and other circumstances, being the same in the copy and the original, their effects are similar in both: and if not equally strong, the defect is not in the resemblance; but the consciousness of an imitation checks that train of thought which the appearance naturally suggests. Yet an over-anxious solicitude to disguise the fallacy is often the means of exposing it: too many points of likeness sometimes hurt the deception; they seem studied and forced; and the affectation of resemblance destroys the supposition of a reality. A hermitage is the habitation of a recluse; it should be distinguished by its solitude, and its simplicity: but if it is filled with crucifixes, hour-glasses, beads, and every other trinket which can be thought of, the attention is diverted from enjoying the retreat to examining the particulars: all the collateral circumstances which agree with a character, seldom meet in one subject; and when they are industriously brought together, though each be natural, the collection is artificial.

16
Of original
characters.

But the art of gardening aspires to more than imitation: it can create *original* characters, and give expressions to the several scenes superior to any they can receive from allusions. Certain properties, and certain dispositions, of the objects of nature, are adapted to excite particular ideas and sensations: many of them have been occasionally mentioned, and all are very well known. They require no discernment, examination, or discussion; but are obvious at a glance, and instantaneously distinguished by our feelings. Beauty alone is not so engaging as this species of character: the impressions it makes are more transient and less interesting; for it aims only at delighting the eye, but the other affects our sensibility. An assemblage of the most elegant forms in the happiest situations is to a degree indiscriminate, if they have not been selected and arranged with a design to produce certain expressions; an air of magnificence, or of simplicity, of cheerfulness, tranquillity, or some other general character, ought to pervade the whole; and objects pleasing in themselves, if they contradict that character, should therefore be excluded: those which are only indifferent, must sometimes make room for such as are more significant; many will often be introduced for no other merit than their expression; and some, which are in general rather disagreeable, may occasionally be recommended by it. Barrenness itself may be an acceptable circumstance in a spot dedicated to solitude and melancholy.

The power of such characters is not confined to the ideas which the objects immediately suggest; for these are connected with others, which insensibly lead to subjects far distant perhaps from the original thought, and related to it only by a similitude in the sensations they excite. In a prospect enriched and enlivened with inhabitants and cultivation, the attention is caught at first by the circumstances which are gayest in their season, the bloom of an orchard; the festivity of a hay-field, and the carols of harvest-home; but the cheerfulness which these infuse into the mind, expands afterwards to other objects than those immediately presented to the eye; and we are thereby disposed to receive, and delighted to pursue, a variety of pleasing

ideas, and every benevolent feeling. At the sight of a ruin, reflections on the change, the decay, and the desolation before us, naturally occur; and they introduce a long succession of others, all tinged with that melancholy which these have inspired; or if the monument revive the memory of former times, we do not stop at the simple fact which it records, but recollect many more coeval circumstances, which we see, not perhaps as they were, but as they are come down to us, venerable with age, and magnified by fame. Even without the assistance of buildings or other adventitious circumstances, nature alone furnishes materials for scenes which may be adapted to almost every kind of expression: their operation is general, and their consequences are infinite: the mind is elevated, depressed, or composed, as gaiety, gloom, or tranquillity, prevails in the scene; and we soon lose sight of the means by which the character is formed; we forget the particular objects it presents; and giving way to their effects, without recurring to the cause, we follow the track they have begun, to any extent which the disposition they accord with will allow. It suffices that the scenes of nature have a power to affect our imagination and our sensibility; for such is the constitution of the human mind, that if once it is agitated, the emotion spreads far beyond the occasion; when the passions are roused, their course is unrestrained; when the fancy is on the wing, its flight is unbounded; and, quitting the inanimate objects which first gave them their spring, we may be led by thought above thought, widely differing in degree, but still corresponding in character, till we rise from familiar subjects up to the sublimest conceptions, and are rapt in the contemplation of whatever is great or beautiful, which we see in nature, feel in man, or attribute to divinity.

IV. GENERAL ARRANGEMENT. Notwithstanding the nature of the place, as already observed, ought not to be sacrificed to the mansion;—the house must ever be allowed to be a principal in the composition. It ought to be considered as the centre of the system; and the rays of art, like those of the sun, should grow fainter as they recede from the centre. The house itself being entirely a work of art, its immediate environs should be highly finished; but as the distance increases, the appearance of design should gradually diminish, until nature and fortuitousness have full possession of the scene.

In general, the approach should be to the back-front, which, in suitable situations, ought to lie open to the pasture-grounds. On the sides more highly ornamented, a well-kept gravel-walk may embrace the walls; to this the shaven lawn and shrubbery succeed; next, the grounds closely pastured; and, lastly, the surrounding country, which ought not to be considered as out of the artist's reach: for his art consists not more in decorating particular spots, than in endeavouring to render the whole face of nature delightful.

Another reason for this mode of arrangement is, objects immediately under the eye are seen more distinctly than those at a distance, and ought to be such as are pleasing in the detail. The beauties of a flower can be discerned on a near view only; whilst at a distance a roughet of coppice-wood, and the most elegant arrangement

*Pract.
Treat. on
Planting
and Gardening.*

1
rangement

Hunting-
Box, &c.Ibid.
p. 606.

arrangement of flowering shrubs have the same effect. The most rational entertainment the human mind is capable of receiving, is that of observing the operations of nature. The foliage of a leaf, the blowing of flowers, and the maturation of fruit, are among the most delightful subjects that a contemplative mind can be employed in. These processes of nature are slow; and except the object fall spontaneously under the eye of the observer, the inconveniences of visiting it in a remote part, so far interfere with the more important employments of life, as to blunt, if not destroy, the enjoyment. This is a strong argument in favour of shrubs and flowers being planted under or near our windows, especially those from whence they may be viewed during the hours of leisure and tranquillity.

Further, the vegetable creation being subject to the

animal, the shrub may be cropt, or the flower trodden down in its day of beauty. If therefore we wish to converse with nature in private, intruders must be kept off,—the shrubbery be severed from the ground;—yet not in such a manner as to drive away the pasturing stock from our sight. For this reason, the shaven lawn ought not to be too extensive, and the fence which incloses it should be such as will not interrupt the view; but whether it be seen or unseen, suspected or unsuspected, is a matter of no great import: its utility in protecting the shrubs and flowers,—in keeping the horns of the cattle from the window, and the feet of the sheep from the gravel and broken ground,—in preserving that neatness on the outside, which ought to correspond with the finishings and furniture within,—render it of sufficient importance to become even a part of the ornament.

Villa.

PART II. EXECUTION OF THE GENERAL SUBJECTS.

IMPROVEMENTS in general may be classed under the following heads: The *Hunting-Box*, The *Ornamented Cottage*, the *Villa*, and the *Principal Residence*.

But before any step can be taken towards the execution of the design, be it large or small, a map or plan of the place, exactly as it lies in its unimproved state, should be made; with a corresponding sketch, to mark the intended improvements upon. Not a hovel nor a twig should be touched, until the artist has studied maturely the natural abilities of the place, and has decidedly fixed in his mind, and finally settled on his plan, the proposed alterations: and even then, let him “dare with caution.”

1. Of Improvements adapted to a HUNTING-BOX.

HERE art has little to do. Hunting may be called the amusement of nature; and the place appropriated to it ought to be no farther altered from its natural state than decency and convenience require:—With men who live in the present age of refinement, “a want of decency is a want of sense.”

Ibid.
p. 610, &c.

The style throughout should be *masculine*. If shrubs be required, they should be of the hardier sorts; the box, the holly, the laurustinus. The trees should be the oak and the beech, which give in autumn an agreeable variety of foliage, and anticipate as it were the season of diversion. A suite of paddocks should be seen from the house; and if a view of distant covers can be caught, the back-ground will be complete. The stable, the kennel, and the leaping-bar, are the factitious accompaniments; in the construction of which simplicity, substantialness, and convenience, should prevail.

2. Of the Styles of an ORNAMENTED COTTAGE.

NEATNESS and simplicity ought to mark the style of this rational retreat. Ostentation and show should be cautiously avoided; even elegance should not be attempted; though it may not be hid, if it offer itself spontaneously.

Nothing, however, should appear vulgar, nor should simplicity be pared down to baldness; every thing whimsical or expensive ought to be studiously avoided;—chaateness and frugality should appear in every part.

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Near the house a studied neatness may take place; but at a distance, negligence should rather be the characteristic.

If a taste for botany lead to a collection of native shrubs and flowers, a shrubbery will be requisite; but in this every thing should be native. A gaudy exotic ought not to be admitted; nor should the lawn be kept close shaven; its flowers should be permitted to blow; and the herbage, when mown, ought to be carried off, and applied to some useful purpose.

In the artificial accompaniments, ornament must be subordinate; utility must preside. The buildings, if any appear, should be those in actual use in rural economies. If the hovel be wanted, let it appear; and, as a side-screen, the barn and rick-yard are admissible; whilst the dove-house and poultry-yard may enter more freely into the composition.

In fine, the ornamented cottage ought to exhibit cultivated nature in the first stage of refinement. It ranks next above the farm-house. The plain garb of rusticity may be set off to advantage; but the studied dress of the artist ought not to appear. That becoming neatness, and those domestic conveniences, which render the rural life agreeable to a cultivated mind, are all that should be aimed at.

3. Of the Embellishments of a VILLA.

THIS demands a style very different from the preceding. It ought to be elegant, rich, or grand, according to the style of the house itself, and the state of the surrounding country; the principal business of the artist being to connect these two in such a manner, that the one shall not appear naked or glaring, nor the other desolate and inhospitable.

If the house be stately, and the adjacent country rich and highly cultivated, a shrubbery may intervene, in which art may show her utmost skill. Here, the artist may even be permitted to play at landscape: for a place of this kind being supposed to be small, the purpose principally ornamental, and the point of view probably confined simply to the house, side screens may be formed, and a fore-ground laid out suitable to the best distance that can be caught.

If buildings or other artificial ornaments abound in the offscap, so as to mark it strongly, they ought also

to appear more or less in the fore-ground: if the distance abound with wood, the fore-ground should be thickened, lest baldness should offend; if open and naked, elegance rather than richness ought to be studied, lest heaviness should appear.

Ibid.

It is far from being any part of our plan to cavil unnecessarily at artists, whether living or dead; we cannot, however, refrain from expressing a concern for the almost total neglect of the principles here in ornamenting the vicinages of villas. It is to be regretted, that in the present practice these principles seem to be generally lost sight of. Without any regard to uniting the house with the adjacent country, and, indeed, seemingly without any regard whatever to the offscap, one invariable plan of embellishment prevails; namely, that of stripping the fore-ground entirely naked, or nearly so, and surrounding it with a wavy border of shrubs and a gravel walk; leaving the area, whether large or small, one naked sheet of green sward.

In small confined spots, this plan may be eligible. But a simple border round a large unbroken lawn only serves to show what more is wanted. Simplicity in general is pleasing; but even simplicity may be carried to an extreme, so as to convey no other idea than that of poverty and baldness. Besides, how often do we see in natural scenery, the holly and the fox-glove flourishing at the foot of an oak, and the primrose and the campion adding charms to the hawthorn scattered over the pastured lawn? And we conceive that single trees footed with evergreens and native flowers, and clumps as well as borders of shrubs, are admissible in ornamental as well as in natural scenery.

The species of shrub will vary with the purpose. If the principal intention be a winter retreat, evergreens and the early-blowing shrubs should predominate; but in a place to be frequented in summer and autumn, the deciduous tribes ought chiefly to be planted.

4. Of the PRINCIPAL RESIDENCE.

Here the whole art centres. The artist has here full scope for a display of taste and genius. He has an extent of country under his eye, and will endeavour to make the most of what nature and accident have spread before him.

Round a principal residence, a gentleman may be supposed to have some considerable estate, and it is not a shrubbery and a ground only which fall under the consideration of the artist: he ought to endeavour to disclose to the view, either from the house or some other point, as much as he conveniently can of the adjacent estate. The love of possession is deeply planted in every man's breast; and places should bow to the gratification of their owners. To curtail the view by an artificial side-screen, or any other unnatural machinery, so as to deprive a man of the satisfaction of over-looking his own estate, is an absurdity which no artist ought to be permitted to be guilty of. It is very different, however, where the property of another intrudes upon the eye: Here the view may, with some colour of propriety, be bounded by a woody screen.

The grounds, however, by a proper management, may be made independent of whatever is external; and though prospects are no where more delightful than from a point of view which is also a beautiful spot, yet

if in the environs of such a garden they should be wanting, the elegant, picturesque, and various scenes within itself, almost supply the deficiency.

"This (says Mr Wheatley) is the character of the gardens at Stowe: for there the views in the country are only circumstances subordinate to the scenes; and the principal advantage of the situation is the variety of the ground within the inclosure. The house stands on the brow of a gentle ascent; part of the gardens lie on the declivity, and spread over the bottom beyond it: this eminence is separated by a broad winding valley from another which is higher and steeper; and the descents of both are broken by large dips and hollows, sloping down the sides of the hills. The whole space is divided into a number of scenes, each distinguished with taste and fancy; and the changes are so frequent, so sudden, and complete, the transitions so artfully conducted, that the same ideas are never continued or repeated to satiety.

These gardens were begun when regularity was in fashion; and the original boundary is still preserved, on account of its magnificence: for round the whole circuit, of between three or four miles, is carried a very broad gravel-walk, planted with rows of trees, and open either to the park or the country; a deep-funk fence attends it all the way, and comprehends a space of near 400 acres. But in the interior scenes of the garden, few traces of regularity appear; where it yet remains in the plantations, it is generally disguised: every symptom, almost, of formality is obliterated from the ground; and an octagon basin in the bottom is now converted into an irregular piece of water, which receives on one hand two beautiful streams, and falls on the other down a cascade into a lake.

In the front of the house is a considerable lawn, open to the water: beyond which are two elegant Doric pavilions, placed in the boundary of the garden, but not marking it, though they correspond to each other; for still further back, on the brow of some rising grounds without the inclosure, stands a noble Corinthian arch, by which the principal approach is conducted, and from which all the gardens are seen, reclining back against their hills: they are rich with plantations; full of objects; and lying on both sides of the house almost equally, every part is within a moderate distance, notwithstanding the extent of the whole.

On the right of the lawn, but concealed from the house, is a perfect garden-scene, called the *queen's amphitheatre*, where art is avowed, though formality is avoided. The fore ground is scooped into a gentle hollow. The plantations on the sides, though but just rescued from regularity, yet in style are contrasted to each other: they are, on one hand, chiefly thickets, standing out from a wood; on the other, they are open groves, through which a glimpse of the water is visible. At the end of the hollow on a little knole, quite detached from all appendages, is placed an open Ionic rotunda: beyond it, a large lawn slopes across the view; a pyramid stands on the brow; the queen's pillar, in a recess on the descent; and all the three buildings, being evidently intended for ornament alone, are peculiarly adapted to a garden-scene. Yet their number does not render it gay: the dusky hue of the pyramid, the retired situation of the queen's pillar, and the

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the solitary appearance of the rotunda, give it an air of gravity; it is encompassed with wood; and all the external views are excluded; even the opening into the lawn is but an opening into an inclosure.

At the king's pillar, very near to this, is another lovely spot; which is small, but not confined; for no termination appears; the ground one way, the water another, retire under the trees out of sight, but nowhere meet with a boundary. The view is first over some very broken ground, thinly and irregularly planted; then between two beautiful clumps, which feather down to the bottom; and afterwards across a glade, and through a little grove beyond it, to that part of the lake where the thickets, close upon the brink, spread a tranquillity over the surface, in which their shadows are reflected. Nothing is admitted to disturb that quiet: no building obtrudes; for objects to fix the eye are needless in a scene which may be comprehended at a glance; and none would suit the pastoral idea it inspires, of elegance too refined for a cottage, and of simplicity too pure for any other edifice.

The situation of the rotunda promises a prospect more enlarged; and in fact most of the objects on this side of the garden are there visible: but they want both connection and contrast; each belongs peculiarly to some other spot: they all are blended together in this, without meaning; and are rather shown on a map, than formed into a picture. The water only is capital; a broad expanse of it is so near as to be seen under the little groupings on the bank without interruption. Beyond it is a wood, which in one place leaves the lake, to run up behind a beautiful building, of three pavilions joined by arcades, all of the Ionic order: it is called *Kent's Building*. And never was a design more happily conceived: it seems to be characteristically proper for a garden; it is so elegant, so varied, and so purely ornamental: it directly fronts the rotunda, and a narrow rim of the country appears above the trees beyond it. But the effect even of this noble object is fainter here than at other points: its position is not the most advantageous; and it is but one among many other buildings, none of which are principal.

The scene at the temple of Bacchus is in character directly the reverse of that about the rotunda, though the space and the objects are nearly the same in both: but in this, all the parts concur to form one whole. The ground from every side shelves gradually towards the lake; the plantations on the further bank open to show Kent's building, rise from the water's edge towards the knole on which it stands, and close again behind it. That elegant structure, inclined a little from a front view, becomes more beautiful by being thrown into perspective; and though at a greater distance, is more important than before, because it is alone in the view: for the queen's pillar and the rotunda are removed far aside; and every other circumstance refers to this interesting object: the water attracts, the ground and the plantations direct, the eye thither: and the country does not just glimmer in the offscap, but is close and eminent above the wood, and connected by clumps with the garden. The scene all together is a most animated landscape; and the splendor of the building; the reflection in the lake; the transparency

of the water, and picturesque beauty of its form, diversified by little groupings on the brink, while on the broadest expanse no more trees cast their shadows than are sufficient to vary the tints of the surface; all these circumstances, vying in lustre with each other, and uniting in the point to which every part of the scene is related, diffuse a peculiar brilliancy over the whole composition.

The view from Kent's building is very different from those which have been hitherto described. They are all directed down the declivity of the lawn. This rises up the ascent: the eminence being crowned with lofty wood, becomes thereby more considerable; and the hillocks into which the general fall is broken, sloping further out this way than any other, they also acquire an importance which they had not before; that, particularly, on which the rotunda is placed, seems here to be a profound situation; and the structure appears to be properly adapted to so open an exposure. The temple of Bacchus, on the contrary, which commands such an illustrious view, is itself a retired object, close under the covert. The wood rising on the brow, and descending down one side of the hill, is shown to be deep; is high, and seems to be higher than it is. The lawn too is extensive; and part of the boundary being concealed, it suggests the idea of a still greater extent. A small portion only of the lake indeed is visible; but it is not here an object: it is a part of the spot; and neither termination being in sight, it has no diminutive appearance: if more water had been admitted, it might have hurt the character of the place, which is sober and temperate; neither solemn nor gay; great and simple, but elegant; above rusticity, yet free from ostentation.

These are the principal scenes on one side of the gardens. On the other, close to the lawn before the house, is the winding valley abovementioned: the lower part of it is assigned to the Elysian fields. These are watered by a lovely rivulet; are very lightsome, and very airy, so thinly are the trees scattered about them; are open at one end to more water and a larger glade; and the rest of the boundary is frequently broken to let in objects afar off, which appear still more distant from the manner of showing them. The entrance is under a Doric arch, which coincides with an opening among the trees, and forms a kind of vista, through which a Pembroke bridge just below, and a lodge built like a castle in the park, are seen in a beautiful perspective. That bridge is at one extremity of the gardens; the queen's pillar is at another; yet both are visible from the same station in the Elysian fields: and all these external objects are unaffectedly introduced, divested of their own appurtenances, and combined with others which belong to the spot. The temple of Friendship also is in sight, just without the place; and within it, are the temples of ancient Virtue, and of the British worthies; the one in an elevated situation, the other low down in the valley, and near to the water: both are decorated with the effigies of those who have been most distinguished for military, civil, or literary merit; and near to the former stands a rostral column, sacred to the memory of Captain Grenville, who fell in an action at sea: by placing here the meed of valour, and by filling these fields with the representations of those who have deserved

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best of mankind, the character intended to be given to the spot is justly and poetically expressed; and the number of the images which are presented or excited, perfectly corresponds with it. Solitude was never reckoned among the charms of Elysium; it has been always pictured as the mansion of delight and of joy: and in this imitation, every circumstance accords with that established idea. The vivacity of the stream which flows through the vale; the glimpses of another approaching to join it; the sprightly verdure of the green sward, and every bust of the British worthies reflected in the water; the variety of the trees; the lightness of the greens; their disposition; all of them distinct objects, and dispersed over gentle inequalities of the ground; together with the multiplicity of objects both within and without, which embellish and enliven the scene; give it a gaiety, which the imagination can hardly conceive, or the heart wish to be exceeded.

Close by this spot, and a perfect contrast to it, is the alder grove; a deep recess in the midst of a shade, which the blaze of noon cannot brighten. The water seems to be a stagnated pool, eating into its banks; and of a peculiar colour, not dirty but clouded; and dimly reflecting the dun hue of the horse-chestnuts and alders which press upon the brink: the stems of the latter, rising in clusters from the same root, bear one another down, and slant over the water. Misshapen elms and ragged firs are frequent in the wood which encompasses the hollow; the trunks of dead trees are left standing amongst them; and the uncouth sumach, and the yew, with elder, nut, and holly, compose the underwood: some limes and laurels are intermixed; but they are not many: the wood is in general of the darkest greens; and the foliage is thickened with ivy, which not only twines up the trees, but creeps also over the falls of the ground: there are steep and abrupt: the gravel-walk is covered with moss; and a grotto at the end, faced with broken flints and pebbles, preserves, in the simplicity of its materials, and the duskiness of its colour, all the character of its situation: two little rotundas near it were better away; one building is sufficient for such a scene of solitude as this, in which more circumstances of gloom concur than were ever perhaps collected together.

Immediately above the alder-grove is the principal eminence in the gardens. It is divided by a great dip into two pinnacles; upon one of which is a large Gothic building. The space before this structure is an extensive lawn: the ground on one side falls immediately into the dip; and the trees which border the lawn, sinking with the ground, the house rises above them, and fills the interval: the vast pile seems to be still larger than it is; for it is thrown into perspective, and between and above the heads of the trees, the upper story, the porticoes, the turrets and ballustrades, and all the slated roofs, appear in a noble confusion. On the other side of the Gothic building, the ground slopes down a long-continued declivity into a bottom, which seems to be perfectly irriguous. Divers streams wander about it in several directions: the conflux of that which runs from the Elysian fields with another below it, is full in sight; and a plain wooden bridge thrown over the latter, and evidently designed for a passage, imposes an air of reality on the river. Be-

yond it is one of the Doric porticoes which front the house; but now it is alone; it stands on a little bank above the water, and is seen under some trees at a distance before it: thus grouped, and thus accompanied, it is a happy incident, concurring with many other circumstances to distinguish this landscape by a character of cheerfulness and amenity.

From the Gothic building a broad walk leads to the Grecian valley, which is a scene of more grandeur than any in the gardens. It enters them from the park, spreading at first to a considerable breadth; then winds; grows narrower, but deeper; and loses itself at last in a thicket, behind some lofty elms, which interrupt the sight of the termination. Lovely woods and groves hang all the way on the declivities: and the open space is broken by detached trees; which, near the park, are cautiously and sparingly introduced, lest the breadth should be contracted by them; but as the valley sinks, they advance more boldly down the sides, stretch across or along the bottom, and cluster at times into groupes and forms, which multiply the varieties of the larger plantations. Those are sometimes close coverts, and sometimes open groves: the trees rise in one upon high stems, and feather down to the bottom in another; and between them are short openings into the park or the gardens. In the midst of the scene, just at the bend of the valley, and commanding it on both sides, upon a large, easy, natural rise, is placed the temple of Concord and Victory: at one place its majestic front of six Ionic columns, supporting a pediment filled with bas relief, and the points of it crowned with statues, faces the view; at another, the beautiful colonnade, on the side, of ten lofty pillars, retires in perspective. It is seen from every part; and impressing its own character of dignity on all around, it spreads an awe over the whole: but no gloom, no melancholy, attends it: the sensations it excites are rather placid; but full of respect, admiration, and solemnity: no water appears to enliven, no distant prospect to enrich the view; the parts of the scene are large, the idea of it sublime, and the execution happy; it is independent of all adventitious circumstances, and relies on itself for its greatness.

The scenes which have been described are such as are most remarkable for beauty or character; but the gardens contain many more; and even the objects in these, by their several combinations, produce very different effects, within the distance sometimes of a few paces, from the unevenness of the ground, the variety of the plantations, and the number of the buildings. The multiplicity of the last has indeed been often urged as an objection to Stowe; and certainly, when all are seen by a stranger in two or three hours, twenty or thirty capital structures, mixed with others of inferior note, do seem too many. But the growth of the wood every day weakens the objection, by concealing them one from the other: each belongs to a distinct scene; and if they are considered separately, at different times, and at leisure, it may be difficult to determine which to take away. Yet still it must be acknowledged that their frequency destroys all ideas of silence and retirement. Magnificence and splendor are the characteristics of Stowe: it is like one of those places celebrated in antiquity, which were devoted to the purposes of religion, and filled with sacred groves, hallowed foun-

tains.

tains, and temples dedicated to several deities; the resort of distant nations, and the object of veneration to half the heathen world: this pomp is, at Stowe, blended with beauty; and the place is equally distinguished by its amenity and its grandeur.

In the midst of so much embellishment as may be introduced into this species of garden, a plain field, or a sheep-walk, is sometimes an agreeable relief, and even wilder scenes may occasionally be admitted. These indeed are not properly parts of a garden, but they may be comprehended within the verge of it; and the proximity to the more ornamented scenes is at least a convenience, that the transition from the one to the other may be easy; and the change always in our option. For though a spot in the highest state of improvement be a necessary appendage to a seat; yet, in a place which is perfect, other characters will not be wanting: if they cannot be had on a large scale, they are acceptable on a smaller; and so many circumstances are common to all, that they may often be intermixed; they may always border on each other."

But on this head it would be in vain to attempt to lay down particular rules: different places are marked by sets of features as different from each other as are those in mens faces. Much must be left to the skill and taste of the artist; and let those be what they may, nothing but mature study of the natural abilities of the particular place to be improved can render him equal to the execution, so as to make the most of the materials that are placed before him.

Some few general rules may nevertheless be laid down. The approach ought to be conducted in such a manner, that the striking features of the place shall burst upon the view at once: no trick however should be made use of: all should appear to fall in naturally. In leading towards the house, its direction should not be fully in front, nor exactly at an angle, but should pass obliquely upon the house and its accompaniments; so that their position with respect to each other, as well as the perspective appearance of the house itself, may vary at every step: and having shown the front and the principal wing, or other accompaniment, to advantage, the approach should wind to the back-front, which, as has been already observed, ought to lie open to the park or pastured grounds.

The improvements and the rooms from which they are to be seen should be in unison. Thus, the view from the drawing-room should be highly embellished, to correspond with the beauty and elegance within: every thing here should be feminine, elegant, beautiful, such as attunes the mind to politeness and lively conversation. The breakfasting-room should have more masculine objects in view: wood, water, and an extended country for the eye to roam over; such as allures us imperceptibly to the ride or the chace. The eating and banqueting rooms need no exterior allurements.

There is a harmony in taste as in music: variety, and even wildness upon some occasions, may be admitted; but discord cannot be allowed. If, therefore, a place be so circumstanced as to consist of properties totally irreconcilable, the parts ought, if possible, to be separated in such a manner, that, like the air and the recitative, the adagio and the allegro, in music, they may set off each other's charms by the contrast.—

These observations, in the elegant performance whence they are extracted, the author illustrates by the following description and proposed improvement of Persefield, the seat of Mr Morris, near Chepstow in Monmouthshire; of Persefield, *ibid.* of her favours, and which has been spoken of by Mr p. 616, &c. Wheatley, Mr Gilpin, and other writers, in the most flattering terms.

Persefield is situated upon the banks of the river Wye, which divides Gloucestershire and Monmouthshire, and which was formerly the boundary between England and Wales. The general tendency of the river is from north to south; but about Persefield it describes by its winding course the letter S, somewhat compressed, so as to reduce it in length and increase its width. The grounds of Persefield are lifted high above the bed of the river, shelving, and form the brink of a lofty and steep precipice, towards the south-west.

"The lower limb of the letter is filled with Persewood, which makes a part of Persefield; but is at present an impenetrable thicket of coppice-wood. This dips to the south-east down to the water's edge; and, seen from the top of the opposite rock, has a good effect.

"The upper limb receives the farms of Llancoet: rich and highly cultivated: broken into inclosures, and scattered with groupes and single trees: two well-looking farm-houses in the centre, and a neat white chapel on one side: altogether a lovely little paradisaical spot. The lowliness of its situation stamps it with an air of meekness and humility; and the natural barriers which surround it adds that of peacefulness and security. These picturesque farms do not form a low flat bottom, subject to be overflowed by the river; but take the form of a gorget, rising fullest in the middle, and falling on every side gently to the brink of the Wye; except on the east-side, where the top of the gorget leans in an easy manner against a range of perpendicular rock; as if to show its disk with advantage to the walks of Persefield.

"This rock stretches across what may be called the *Isthmus*, leaving only a narrow pass down into the fields of Llancoet, and joins the principal range of rocks at the lower bend of the river.

"To the north, at the head of the letter, stands an immense rock (or rather a pile of immense rocks heaped one above another) called *Windcliff*; the top of which is elevated as much above the grounds of Persefield as those are above the fields of Llancoet.

"These several rocks, with the wooded precipices on the side of Persefield, form a circular inclosure, about a mile in diameter, including Persewood, Llancoet, the Wye, and a small meadow lying at the foot of Windcliff.

"The grounds are divided into the upper and lower lawn, by the approach to the house: a small irregular building, standing near the brink of the precipice, but facing down the lower lawn, a beautiful ground, falling 'precipitately every way into a valley which shelves down in the middle,' and is scattered with groupes and single trees in an excellent style.

"The view from the house is soft, rich, and beautifully picturesque; the lawn and woods of Persefield and the opposite banks of the river; the Wye, near its mouth, winding through 'meadows green as emerald,'

Principal
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of Perse-
field, *ibid.*

p. 616, &c.

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rald,' in a manner peculiarly graceful; the Severn, here very broad, backed by the wooded and highly cultivated hills of Gloucestershire, Wiltshire, and Somersetshire. Not one rock enters into the composition. The whole view consists of an elegant arrangement of lawn, wood, and water.

"The upper lawn is a less beautiful ground, and the view from it, though it command the 'cultivated hills and rich valleys of Monmouthshire,' bounded by the Severn and backed by the Mendip-hills, is much inferior to that from the house.

"To give variety to the views from Persefield, to disclose the native grandeur which surrounds it, and to set off its more striking features to advantage, walks have been cut through the woods and on the face of the precipice which border the grounds to the south and east. The viewer enters these walks at the lower corner of the lower lawn.

"The first point of view is marked by an alcove, from which are seen the bridge and the town of Chepstow, with its castle situated in a remarkable manner on the very brink of a perpendicular rock, washed by the Wye; and beyond these the Severn shows a small portion of its silvery surface.

"Proceeding a little farther along the walk, a view is caught which the painter might call a complete landscape: The castle with the serpentine part of the Wye below Chepstow, intermixed in a peculiar manner with the broad waters of the Severn, form the fore-ground; which is backed by distant hills; the rocks, crowned with wood, lying between the alcove and the castle, to the right; and Castlehill farm, elevated upon the opposite banks of the river, to the left, form the two side-scenes. This point is not marked, and must frequently be lost to the stranger.

"The grotto, situated at the head of Perse-wood, commands a near view of the opposite rocks; magnificent beyond description! The littleness of human art was never placed in a more humiliating point of view; the castle of Chepstow, a noble fortress, is, compared with these natural bulwarks, a mere house of cards.

"Above the grotto, upon the isthmus of the Persefield side, is a shrubbery; strangely misplaced! an unpardonable intrusion upon the native grandeur of this scene. Mr Gilpin's observations upon this, as upon every other occasion, are very just. He says, 'It is pity the ingenious embellisher of these scenes could not have been satisfied with the great beauties of nature which he commanded. The shrubberies he has introduced in this part of his improvements I fear will rather be esteemed paltry.'—'It is not the shrub which offends; it is the formal introduction of it. Wild underwood may be an appendage of the grandest scene; it is a beautiful appendage. A bed of violets or of lilies may enamel the ground with propriety at the foot of an oak; but if you introduce them artificially in a border, you introduce a trifling formality, and disgrace the noble object you wish to adorn.'

"The walk now leaves the wood, and opens upon the lower lawn, until coming near the house it enters the alarming precipice facing Llancot; winding along the face of it in a manner which does great honour to the artist. Sometimes the fragments of rock which fall in its way are avoided, at other times partially removed, so as to conduct the path along a ledge carved

out of the rock; and in one instance, a huge fragment, of a somewhat conical shape and many yards high, is perforated; the path leading through its base. This is a thought which will hand down to future times the greatness of Mr Morris's taste; the design and the execution are equally great; not a mark of a tool to be seen; all appears perfectly natural. The arch-way is made winding, so that on the approach it appears to be the mouth of a cave; and, on a nearer view, the idea is strengthened by an allowable deception; a black dark hole on the side next the cliff, which, seen from the entrance before the perforation is discovered, appears to be the darksome inlet into the body of the cave.

"From this point, that vast inclosure of rocks and precipices which marks the peculiar magnificence of Persefield is seen to advantage. The area, containing in this point of view the fields of Llancot and the lower margin of Perse-wood, is broken in a manner peculiarly picturesque by the graceful winding of the Wye; here washing a low grassy shore, and their sweeping at the feet of the rocks, which rise in some places perpendicular from the water; but in general they have a wooded offset at the base; above which they rise to one, two, or perhaps three or four hundred feet high; exposing one full face, silvered by age, and bearded with ivy, growing out of the wrinkle-like seams and fissures. If one might be allowed to compare the paltry performances of art with the magnificent works of nature, we should say, that this inclosure resembles a prodigious fortress which has lain long in ruins. It is in reality one of nature's strong-holds; and as such has probably been frequently made use of. Across the isthmus on the Gloucestershire side there are the remains of a deep intrenchment, called to this day the *Bulwark*; and tradition still teems with the extraordinary warlike feats that have been performed among this romantic scenery.

"From the perforated rock, the walk leads down to the cold-bath (a complete place), seated about the mid-way of the precipice, in this part less steep; and from the cold-bath a rough path winds down to the meadow, by the side of the Wye, from whence the precipice on the Persefield side is seen with every advantage; the giant fragments, hung with shrubs and ivy, rise in a gaily manner from amongst the underwood, and show themselves in all their native savageness.

"From the cold-bath upward, a coach-road (very steep and difficult) leads to the top of the cliff, at the upper corner of the upper lawn. Near the top of the road is a point which commands one of the most pleasing views of Persefield: The Wye sweeping through a grassy vale which opens to the left:—Llancot backed by its rocks, with the Severn immediately behind them; and, seen in this point of view, seems to be divided from the Wye by only a sharp ridge of rock, with a precipice on either side; and behind the Severn, the vale and wooded hills of Gloucestershire.

"From this place a road leads to the top of Wind-cliff—astonishing sight! The face of nature probably affords not a more magnificent scene! Llancot in all its grandeur, the grounds of Persefield, the castle and town of Chepstow, the graceful windings of the Wye below, and its conflux with the Severn; to the left the forest of Dean; to the right, the rich marshes and picturesque

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picturesque mountains of South Wales; a broad view of the Severn, opening its sea-like mouth; the conflux of the Avon, with merchant ships at anchor in King-road, and vessels of different descriptions under sail; Aust-Cliff, and the whole vale of Berkeley, backed by the wooded swells of Gloucestershire, the view terminating in clouds of distant hills, rising one behind another, until the eye becomes unable to distinguish the earth's billowy surface from the clouds themselves."

The leading principle of the improvement proposed by our author is, to "separate the sublime from the beautiful; so that in viewing the one, the eye might not so much as suspect that the other was near."

"Let the hanging walk be conducted entirely along the precipices, or through the thickets, so as to disclose the natural scenery, without once discovering the lawn or any other acquired softness. Let the path be as rude as if trodden only by wild beasts and savages, and the resting-places, if any, as rustic as possible."

"Erase entirely the present shrubbery, and lay out another as elegant as nature and art could render it before the house, swelling it out into the lawn towards the stables; between which and the kitchen-garden make a narrow winding entrance."

"Convert the upper lawn into a deer-paddock, suffering it to run as wild, rough, and forest-like as total negligence would render it."

"The viewer would then be thus conducted: He would enter the hanging-walk by a sequestered path at the lower corner of the lawn, pursuing it through the wood to beneath the grotto, and round the head-land, or winding through Perfewood, to the perforated rock and the cold-bath, without once conceiving an idea (if possible) that art, or at least that much art, had been made use of in disclosing the natural grandeur of the surrounding objects; which ought to appear as if they presented themselves to his view, or at most as if nothing was wanted but his own penetration and judgement to find them out. The walk should therefore be conducted in such a manner, that the breaks might be quite natural; yet the points of view obvious, or requiring nothing but a block or a stone to mark them. A stranger at least wants no seat here; he is too eager, in the early part of his walk, to think of lounging upon a bench."

"From the cold-bath he would ascend the steep, near the top of which a commodious bench or benches might be placed: the fatigue of ascending the hill would require a resting-place; and there are few points which afford a more pleasing view than this; it is grand, without being too broad and glaring."

"From these benches he would enter the forest part. Here the idea of Nature in her primitive state would be strengthened: the roughnesses and deer to the right, and the rocks in all their native wildness to the left. Even Llançot might be shut out from the view by the natural shrubbery of the cliff. The Lover's Leap, however (a tremendous peep), might remain; but no benches, nor other work of art, should here be seen. A natural path, deviating near the brink of the precipice, would bring the viewer down to the lower corner of the park; where benches should be placed in a happy point, so as to give a full view of the rocks and native wildnesses, and at the same time hide the farm-houses, fields, and other acquired beauties of Llançot."

"Having satiated himself with this savage scene, he

would be led, by a still rustic path, through the labyrinth—when the shrubbery, the lawn, with all its appendages, the graceful Wye, and the broad silver Severn, would break upon the eye with every advantage of ornamental nature: the transition could not fail to strike."

"From this soft scene he would be shown to the top of Windcliff, where in one vast view he would unite the sublime and beautiful of Perfeld."

Only one other particular remains to be noticed before closing this article. A place which is the residence of a family all the year is very defective, if some portion of it be not set apart for the enjoyment of a fine day, for air, and exercise, in winter. To such a spot shelter is absolutely essential; and evergreens being the thickest covert, are therefore the best: their verdure also is then agreeable to the eye; and they may be arranged so as to produce beautiful mixture of greens, with more certainty than deciduous trees, and with almost equal variety: they may be collected into a wood; and through that wood gravel-walks may be led along openings of a considerable breadth, free from large trees which would intercept the rays of the sun, and winding in such a manner as to avoid any draft of wind, from whatever quarter it may blow. But when a retreat at all times is thus secured, other spots may be adapted only to occasional purposes; and be sheltered towards the north or the east on one hand, while they are open to the sun on the other. The few hours of cheerfulness and warmth which its beams afford are so valuable as to justify the sacrifice even of the principles of beauty to the enjoyment of them; and therefore no objections of sameness or formality can prevail against the pleasantness of a straight walk, under a thick hedge or a south wall. The eye may, however, be diverted from the screen by a border before it, where the acornite and the snowdrop, the crocus and hepatica, brought forward by the warmth of the situation, will be welcome harbingers of spring; and on the opposite side of the walk, little tufts of laurustines, and of variegated evergreens, may be planted. The spot thus enlivened by a variety of colours, and even a degree of bloom, may be still further improved by a green-house. The entertainment which exotics afford peculiarly belongs to this part of the year; and if amongst them be interspersed some of our earliest-flowers, they will there blow before their time, and anticipate the gaiety of the season which is advancing. The walk may also lead to the stoves, where the climate and the plants are always the same. And the kitchen-garden should not be far off; for that is never quite destitute of produce, and always an active scene: the appearance of business is alone engaging; and the occupations there are an earnest of the happier seasons to which they are preparative. By these expedients even the winter may be rendered cheerful in a place where shelter is provided against all but the bitterest inclemencies of the sky, and agreeable objects and interesting amusements are contrived for every hour of tolerable weather."

For the particular operations in gardening, see PLANTING, PRUNING, GRAFTING, INOCULATING, KITCHEN-Garden, ORCHARD, GREEN-HOUSE, HOT-HOUSE, INARCHING, ESPALIER, &c. and the culture and management of different plants under their respective names.

GARDINER,

Principal
Residence.

Gardiner
||
Garland.

GARDINER (Stephen), bishop of Winchester, and lord chancellor of England, born at Bury St Edmunds in Suffolk, natural son to Richard Woodville, brother to queen Elizabeth wife to Edward IV. was learned in the canon and civil laws, and in divinity. He signed the divorce of Henry VIII. from Katharine of Spain; abjured the pope's supremacy; and writ *De vera et falsa obedientia*, in behalf of the king; yet in Edward's reign he opposed the reformation, and was punished with imprisonment; but queen Mary coming to the throne, he enlarged him. He drew up the articles of marriage between the queen and Philip of Spain, which were very advantageous to England. He was violent against the reformers; but on his death-bed was dissatisfied with his life, and often repeated these words: *Erravi cum Petro, sed non flevi cum Petro*. He died in 1555.

GARGARISM (from γαργαρίζω, "to wash the mouth;") a gargle. Its use is for washing the mouth and throat with, when inflammations, ulcerations, &c. are there. A small quantity may be taken into the mouth, and moved briskly about, and then spit out; or if the patient cannot do this to any advantage, the liquor may be injected by a syringe. When gargles are required, their use should be more frequently repeated than is done in common practice.

GARGET, a disease of cattle, consisting in a swelling of the throat and the neighbouring parts; to prevent which bleeding in the spring is recommended.

GARGIL, a distemper in geese, which by stopping the head frequently proves mortal. Three or four cloves of garlic, beaten in a mortar with sweet butter, and made into little balls, and given the creature fasting, are the ordinary cure.

GARIDELLA, in botany: A genus of the trigynia order, belonging to the decandria class of plants; and in the natural method ranking under the 26th order, *Mulifloræ*. The calyx is pentaphyllous, with leaves resembling flower-petals; there are five bilabiate and bifid nectaria; the capsules are polyspermous, and adhering together.

GARIZIM, **GERIZIM**, or *Gerizim*, (anc. geog.) a mountain of Samaria, at the foot of which stood Sichem; so near, that Jotham could be heard by the Sichemites from its top, (Judges ix. 7.) Famous for the temple built on it by Sanballet, in favour of his son-in-law Manasseh, by the permission of Alexander the Great, and 200 years after destroyed by John Hyrcanus, son of Simon, the fourth in succession of the Asmoneans (Josephus).

GARLAND, a sort of chaplet made of flowers, feathers, and sometimes precious stones, worn on the head in manner of a crown.—The word is formed of the French *guirlande*, and that of the barbarous Latin *garlanda*, or Italian *ghirlanda*. Menage traces its origin from *gyrus*, through *gyrulus*, to *gyrulare*, *gyrlandum*, *ghirlandum*; and at length *ghirlanda* and *guirlande*; so that *guirlande* and *garland* are descended in the sixth or seventh degree from *gyrus*.—Hicks rejects this derivation, and brings the word from *gardel banda*, which in the northern languages signify a *nosegay artfully wrought with the hand*.

GARLAND also denotes ornaments of flowers, fruits, and leaves, intermixed; anciently much used at the gates of temples, where feasts and solemn rejoicings

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were held; or at any other place where marks of public joy or gaiety were required, as at triumphal arches, tournaments, &c.

GARLIC. See **ALUM**.

GARMENT, that wherewith any person is clothed. See **DRESS** and **HABIT**.

GARNET, in natural history, a very beautiful gem, of a red colour, with an admixture of blue. See **GRANATE**.

When pure and free from blemishes, it is little inferior in appearance to the oriental ruby, though only of a middle degree of hardness between the sapphire and common crystal. It is found of various sizes, from that of a pin's head to an inch in diameter.

Among our lapidaries and jewellers, genuine garnets are known by different names according to their different degrees of colour. 1. The garnet, simply so called, is the finest and most valuable kind, being of a very deep blood-red, with a faint admixture of blue. 2. The rock-ruby; a name very improperly given to the garnet when it is of a very strong but not deep red, and has a fairer cast of the blue: this is a very beautiful gem. 3. The sorane or serain garnet; that of a yet brighter red, approaching to the colour of native cinnabar, with a faint blue tinge. 4. The almandine, a garnet only a little paler than that called the *rock-ruby*.

GARNET-Colour. See **Colouring of GLASS**.

To imitate GARNETS. The making the counterfeit garnet in paste is done as follows.—Take prepared crystal two ounces, common red-lead six ounces, manganese 16 grains, zaffre three grains; mix all well, put them into a crucible, cover it with lute, and set it in a potter's kiln for 24 hours. Or take crystal two ounces, minium five ounces and a half, manganese 15 grains, zaffre four grains: mix them well together; and let all be baked, in a pot well luted, in a potter's kiln 24 hours.

GARONNE, a large river of France, which taking its rise in the Pyrenean mountains, runs north-west by the city of Tholouse, divides the provinces of Guienne and Gascony, and, visiting the city of Bourdeaux, falls into the Bay of Biscay, about 60 miles below that city. It has also a communication with the Mediterranean, by means of the royal canal of Louis XIV. The tide flows up this river 20 miles above Bourdeaux.

GARRICK (David), Esq; the great Roscius of this age and country, who for near 40 years hath shone the brightest luminary in the hemisphere of the stage, was born at the Angel Inn at Hereford, in the year 1716. His father, Captain Peter Garrick, was a French refugee, and had a troop of horse which were then quartered in that city. This rank he maintained in the army for several years, and had a majority at the time of his death; that event, however, prevented him from ever enjoying it. Mr Garrick received the first rudiments of his education at the free-school at Litchfield; which he afterwards completed at Rochester, under the celebrated Mr Colson, since mathematical professor at Cambridge. Dr Johnson and he were fellow-students at the same school; and it is a curious fact, that these two celebrated geniuses came up to London, with the intention of pushing themselves into active life, in the same coach. On the 9th of March 1736, he was entered

Garlic
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Garrick.

Garrick. entered at the honourable society of Lincoln's-Inn. The study of the law, however, he soon quitted; and followed for some time the employment of a wine-merchant: but that too disgusting him, he gave way at last to the irresistible bias of his mind, and joined a travelling company of comedians at Ipswich in Suffolk, where he went by the name of *Lyddle*. Having in this poor school of Apollo got some acquaintance with the theatric art, he burst at once upon the world, in the year 1740-1, in all the lustre of perfection, at the little theatre in Goodman's Fields, then under the direction of Henry Giffard.

The character he first performed was Richard III. in which, like the sun bursting from behind a cloud, he displayed in the earliest dawn a somewhat more than meridian brightness. His excellence dazzled and astonished every one; and the seeing a young man, in no more than his 24th year, and a novice in reality to the stage, reaching at one single step to that height of perfection which maturity of years and long practical experience had not been able to bestow on the then capital performers of the English stage, was a phenomenon that could not but become the object of universal speculation and of as universal admiration. The theatres at the west end of the town were deserted; Goodman's Fields, from being the rendezvous of citizens and citizens wives alone, became the resort of all ranks of men; and Mr Garrick continued to act till the close of the season.

Having very advantageous terms offered him for the performing in Dublin during some part of the summer (1741), he went over thither, where he found the same just homage paid to his merit which he had received from his own countrymen. To the service of the latter, however, he esteemed himself more immediately bound; and therefore, in the ensuing winter, engaged himself to Mr Fleetwood, then manager of Drury-Lane: in which theatre he continued till the year 1745, when he again went over to Ireland, and continued there the whole season, joint manager with Mr Sheridan in the direction and profits of the theatre-royal in Smock-Alley. From thence he returned to England, and was engaged for the season of 1746 with Mr Rich at Covent-Garden. This was his last performance as an hired actor: for in the close of that season, Mr Fleetwood's patent for the management of Drury-Lane being expired, and that gentleman having no inclination further to pursue a design by which, from his want of acquaintance with the proper conduct of it, or some other cause, he had considerably impaired his fortune; Mr Garrick, in conjunction with Mr Lacy, purchased the property of that theatre, together with the renovation of the patent; and in the winter of 1747, opened it with the greatest part of Mr Fleetwood's company, and with the great additional strength of Mr Barry, Mrs Pritchard, and Mrs Cibber, from Covent-Garden.

Were we to trace Mr Garrick through the several occurrences of his life,—a life so active, so busy, and so full of occurrences as his, we should swell this account to many pages. Suffice it to say, he continued in the unmolested enjoyment of his fame and unrivalled excellence to the moment of his retirement. His universality of excellence was never once attacked by competition. Tragedy, comedy, and farce, the lover and

the hero, the jealous husband who suspects his wife without cause, and the thoughtless lively rake who attacks it without design, were all alike his own. Rage and ridicule, doubt and despair, transport and tenderness, compassion and contempt; love, jealousy, fear, fury, and simplicity; all took in turn possession of his features, while each of them in turn appeared to be the sole possessor of his heart. In the several characters of Lear and Hamlet, Richard, Dorilas, Romeo, and Lufignane; in his Ranger, Bayes, Druggier, Kite-ly, Brute, and Benedick, you saw the muscular conformations that your ideas attached to them all. In short, Nature, the mistress from whom alone this great performer borrowed all his lessons, being in herself inexhaustible, this her darling son, marked out for her truest representative, found an unlimited scope for change and diversity in his manner of copying from her various productions. There is one part of theatrical conduct which ought unquestionably to be recorded to Mr Garrick's honour, since the cause of virtue and morality, and the formation of public manners, are considerably dependent upon it; and that is, the zeal with which he aimed to banish from the stage all those plays which carry with them an immoral tendency, and to prune from those which do not absolutely, on the whole, promote the interests of vice, such scenes of licentiousness and liberty, as a redundancy of wit and too great liveliness of imagination have induced some of our comic writers to indulge themselves in, and which the sympathetic disposition of our age of gallantry and intrigue has given sanction to. The purity of the English stage has certainly been much more fully established during the administration of this theatrical minister, than it had ever been during preceding managements. He seems to have carried his modest, moral, chaste, and pious principles with him into the very management of the theatre itself, and rescued performers from that obloquy which stuck on the profession. Of those who were accounted blackguards, unworthy the association of the world, he made gentlemen, united them with society, and introduced them to all the domestic comforts of life. The theatre was no longer esteemed the receptacle of all vice; and the moral, the serious, the religious part of mankind, did not hesitate to partake of the rational entertainment of a play, and pass a cheerful evening undisgusted with the licentiousness, and uncorrupted by the immorality, of the exhibition.

Notwithstanding the numberless and laborious avocations attendant on his profession as an actor, and his station as a manager; yet still his active genius was perpetually bursting forth in various little productions in the dramatic and poetical way, whose merit cannot but make us regret his want of time for the pursuance of more extensive and important works. It is certain, that his merit as an author is not of the first magnitude: but his great knowledge of men and manners, of stage-effect, and his happy turn for lively and striking satire, made him generally successful; and his prologues and epilogues in particular, which are almost innumerable, possess such a degree of happiness, both in the conception and execution, as to stand unequalled. His Ode on the death of Mr Pelham run through four editions in less than six weeks. His Ode on Shakespeare is a masterly piece of poetry; and when deliver-

Garrick
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Garstang.

ed by himself, was a most capital exhibition. His alterations of Shakespeare and other authors have been at times successful, and at times exploded. The cutting out the grave diggers scene from Hamlet will never be forgot to him by the inhabitants of the gallery at Drury. Though necessary to the chasteness of the scene, they cannot bear to lose so much true sterling wit and humour; and it must be owned, that exuberances of that kind, though they hurt the uniformity, yet increase the luxuriance of the tree. Among his alterations the following are part: Every Man in his Humour, altered from Ben Johnson; Romeo and Juliet, Winter's Tale, Catherine and Petruchio, Cymbeline, Hamlet, &c. altered and made up from Shakespeare; Gamesters, a comedy, from Shirley; Isabella, from Southerne. To these we add, as original productions, The Farmer's Return, and Linco's Travels, interludes; Guardian, Lethe, Lying Valet, Miss in her Teens, Male Coquet, Irish Widow, and other comedies in two acts; Enchanter, a musical entertainment; Lilliput; the Christmas Tale is ascribed to him, and many others.

We now bring him to the period of his retirement in the spring of 1776; when, full of fame, with the acquirement of a splendid fortune, and growing into years, he thought proper to seek the vale of life, to enjoy that dignified and honourable ease which was compatible with his public situation, and which he had so well earned by the activity and the merits of his dramatic reign. But very short indeed was the period allotted to him for this precious enjoyment: for on the 20th of January 1779, he departed this life; leaving no one rival in excellence upon earth to compensate for his loss, or a hope of our ever meeting with his like again.

GARRISON, in the art of war, a body of forces, disposed in a fortress, to defend it against the enemy, or to keep the inhabitants in subjection; or even to be subsisted during the winter-season: hence *garrison* and *winter-quarters* are sometimes used indifferently for the same thing; and sometimes they denote different things. In the latter case, a garrison is a place wherein forces are maintained to secure it, and where they keep regular guard, as a frontier town, a citadel, castle, tower, &c. The garrison should be always stronger than the townsmen.

Du Cange derives the word from the corrupt Latin *garniso*, which the latter writers use to signify all manner of munition, arms, victuals, &c. necessary for the defence of a place, and sustaining of a siege.

Winter-quarters signify a place where a number of forces are laid up in the winter season, without keeping the regular guard.

GARSTANG, a town in Lancashire, 223 miles from London, in the post road between Preston and Lancaster. It is a large populous place, near a mile in length, but built in a very irregular manner, with dirty streets, and very indifferent houses. The church is a stately Gothic structure. By the late inland navigation, it has communication with the rivers Mersey, Dec, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

GARTER, a ligature for tying up the stocking; but particularly used for the badge of a noble order of knights, hence denominated the

Order of the GARTER, a military order of knighthood, the most noble and ancient of any lay-order in the world, instituted by Edward III. The knights-companions are generally princes and peers; and the king of England is the sovereign or chief of the order. The number of knights was originally 26; but six were added in 1786, on account of the increase of the royal family. They are a college or corporation, having a great and little seal.

Their officers are a prelate, chancellor, register, king at arms, and usher of the black rod. They have also a dean, with 12 canons, and petty canons, vergers, and 26 pensioners or poor knights. The prelate is the head. This office is vested in the bishop of Winchester, and has ever been so. Next to the prelate is the chancellor; which office is vested in the bishop of Salisbury, who keeps the seals, &c. The next is the register, who by his oath is to enter upon the registry, the scrutinies, elections, penalties, and other acts of the order with all fidelity: The dean of Windsor is always register *ex officio*. The fourth officer is Garter and King-at-arms, being two distinct offices united in one person. Garter carries the rod and sceptre at the feast of St George, the protector of this order, when the sovereign is present. He notifies the elections of new knights, attends the solemnity of their installations, carries the garter to the foreign princes, &c. He is the principal officer within the college of arms, and chief of the heralds. See *KING-at-Arms*.

All these officers except the prelate have fees and pensions. The college of the order is seated in the castle of Windsor, within the chapel of St George, and the charter-house, erected by the founder for that purpose. The habit and ensign of the order are, a garter, mantle, cape, george, and collar. The three first were assigned the knights companions by the founder; and the george and collar by Henry VIII.

The garter challenges pre-eminence over all the other parts of the dress, by reason that from it the noble order is denominated; that it is the first part of the habit presented to foreign princes and absent knights, who, and all other knights-elect, are therewith first adorned; and it is of so great honour and grandeur, that by the bare investiture with this noble ensign, the knights are esteemed companions of the greatest military order in the world. It is worn on the left leg between the knee and calf, and is enamelled with this motto, *HONI SOIT QUI MAL Y PENSE*; i. e. *Shame to him that thinks evil hereof*: The meaning of which is, that king Edward having laid claim to the kingdom of France, retorted shame and defiance upon him that should dare to think amiss of the just enterprise he had undertaken, for recovering his lawful right to that crown; and that the bravery of those knights whom he had elected into this order, was such as would enable him to maintain the quarrel against those that thought ill of it.

The mantle is the chief of these vestments made use of upon all solemn occasions. The colour of the mantle is by the statutes appointed to be blue. The length of the train of the mantle only distinguishes the sovereign from the knights-companions. To the collar of

the

Garter. the mantle is fixed a pair of long strings, anciently wove with blue silk only, but now twisted round, and made of Venice gold and silk, of the colour of the robe, with knobs or buttons, and tassels at the end. The left shoulder of the mantle has from the institution been adorned with a large garter, with the device, *HONI SOIT, &c.* Within this is the cross of the order, which was ordained to be worn at all times by king Charles I. At length the star was introduced, being a sort of cross irradiated with beams of silver.

The collar is appointed to be composed of pieces of gold in fashion of garters, the ground enamelled blue, and the motto gold.

When the knights wear not their robes, they are to have a silver star on the left side; and they commonly bear the picture of St George, enamelled on gold, and beset with diamonds, at the end of a blue ribbon, crossing the body from the left shoulder. They are not to appear abroad without the garter, on penalty of 6s. 8d. paid to the registrar.

The manner of electing a knight-companion into this most noble order, and the ceremonies of investiture, are as follow. When the sovereign designs to elect a companion of the garter, the chancellor belonging to this order draws up the letters, which, passing both under the sovereign's sign-manual and signet of the order, are sent to the person by Garter principal king at arms; and are in this manner, or to the same effect: "We, with the companions of our most noble order of the garter, assembled in chapter, holden this present day at our castle at Windsor, considering the virtuous fidelity you have shown, and the honourable exploits you have done in our service, by vindicating and maintaining our right, &c. have elected and chosen you one of the companions of our order. Therefore, we require you to make your speedy repair unto us, to receive the ensigns thereof, and be ready for your installation upon the — day of this present month, &c."

The garter, which is of blue velvet bordered with fine gold-wire, having commonly the letters of the motto of the same, is, at the time of election, buckled upon the left leg, by two of the senior companions, who receive it from the sovereign, to whom it was presented upon a velvet cushion, by Garter king at arms, with the usual reverence, whilst the chancellor reads the following admonition, enjoined by the statutes: "To the honour of God omnipotent, and in memorial of the blessed martyr St George, tie about thy leg, for thy renown, this noble garter; wear it as the symbol of the most illustrious order, never to be forgotten or laid aside; that thereby thou mayest be admonished to be courageous; and having undertaken a just war, in which thou shalt be engaged, thou mayest stand firm, valiantly fight, and successively conquer." The princely garter being then buckled on, and the word of its signification pronounced, the knight-elect is brought before the sovereign, who puts about his neck, kneeling, a dark blue ribbon, wherunto is appendant, wrought in gold within the garter, the image of St George on horseback, with his sword drawn, encountering with the dragon. In the mean time, the chancellor reads the following admonition: "Wear this ribbon about thy neck, adorned with the image of the blessed martyr and soldier of Christ St George,

by whose imitation provoked, thou mayest so overpass both prosperous and adverse adventures, that having stoutly vanquished thy enemies both of body and soul, thou mayest not only receive the praise of this transient combat, but be crowned with the palm of eternal victory." Then the knight elected kisses the sovereign's hand; thanks his majesty for the great honour done him; rises up, and salutes all the companions severally, who return their congratulations. See a representation of the above insignia, among others, on the plate belonging to *Orders of KNIGHTHOOD*.

Since the institution of this order, there have been eight emperors and twenty-eight kings, besides numerous sovereign princes, enrolled as companions thereof. Its origin is somewhat differently related. The common account is, that the countess of Salisbury at a ball happening to drop her garter, the king took it up and presented it to her with these words, "*Honi soit qui mal y pense*;" i. e. Evil to him that evil thinks. This accident, it is said, gave rise to the order and the motto; it being the spirit of the times to mix love and war together: but as in the original statutes of this order there is not the least conjecture to countenance such a feminine institution, credit cannot be given to this tradition. Camden, Fern, &c. take it to have been instituted on occasion of the victory obtained by Edward over the French at the battle of Cressley: that prince, say some historians, ordered his garter to be displayed, as a signal of battle; in commemoration whereof, he made a garter the principal ornament of the order erected in memory of this signal victory, and a symbol of the indissoluble union of the knights.

It appears from Rastel's chronicle, lib. vi. quoted by Granger in the supplement to his Biographical History, that this order was devised by Richard I. at the siege of the city of Acres, when he caused twenty-six knights, who firmly stood by him, to wear thongs of blue leather about their legs, and that it was perfected in the nineteenth year of Edward III.

In 1551, Edward VI. made some alterations in the ritual of this order: that prince composed it in Latin, the original whereof is still extant in his own hand-writing. He there ordained, that the order should no longer be called the order of St George, but that of the garter; and, instead of the George, hung at the collar, he substituted a cavalier, bearing a book on the point of his sword, with the word *protectio* graven on the sword, and *verbum Dei* on the book; with a buckle in the left-hand, and the word *fides* thereon. Larrey.

GARTER, principal King at Arms. This office was instituted by Henry V.

Garter, and principal king at arms, are two distinct offices united in one person: Garter's employment is to attend the service of the order of the garter; for which he is allowed a mantle and badge, a house in Windsor-castle, and pensions both from the sovereign and knights, and, lastly, fees. He also carries the rod and sceptre at every feast of St George, when the sovereign is present, and notifies the election of such as are new chosen; attends the solemnity of their installations, and takes care of placing their arms over their seats; and carries the garter to foreign kings and

Garter,
Garth.

princes, for which service it has been usual to join him in commission with some peer, or other person of distinction.

Garter's oath relates only to services being performed within the order, and is taken in chapter before the sovereign and knights. His oath, as king at arms, is taken before the earl marshal.

GARTER is also a term in heraldry, signifying the moiety or half of a bend.

GARTH is used in some parts of England for a little backside or close. It is an ancient British word. Gardd, in that language, signifies *garden*, and is pronounced and written *garth*. This word is also used for a dam or wear, &c.

GARTH-men is used in our statutes for those who catch fish by means of fish-garths, or wears. By statute it is ordained, that no fisher, nor garth-man, shall use any nets or engines to destroy the fry of fish, &c. 17 Ric. II. cap. 9. The word is supposed by some to be derived from the Scotch word *gart*, which signifies *forced* or *compelled*; because fish are forced by the wear to pass in a loop, where they are taken.

GARTH (Sir Samuel), an excellent English poet and physician, was descended from a good family in Yorkshire. He was admitted into the college of physicians at London in 1693. He at that time zealously promoted and encouraged the erecting of the dispensary for the relief of the sick poor, by giving them advice gratis, and medicines at low rates. This work of charity having exposed him and many other physicians to the envy and resentment of several persons of the same faculty as well as apothecaries, he ridiculed them, with a peculiar spirit and vivacity, in a poem called the *Dispensary*, in six cantos, highly esteemed. He was one of the most eminent members of the famous society called the *Kit-Kat Club*, which consisted of noblemen and gentlemen distinguished by their excellent parts and affection to the house of Hanover. Upon the accession of George I. he was knighted, and made physician in ordinary to his majesty, and physician-general to the army. Nor were these more than just rewards even of his physical merit. He had gone through the office of censor of the college in 1702; and had practised always with great reputation, and a strict regard to the honour and interest of the faculty, never stooping to prostitute the dignity of his profession, through mean and sordid views of self-interest, to any even the most popular and wealthy apothecaries. In a steady adherence to this noble principle, he concurred with the much celebrated Dr Radcliffe, with whom he was also often joined in physical consultations. He had a very extensive practice, but was very moderate in his views of advancing his own fortune; his humanity and good-nature inclining him more to make use of the great interest he had with persons in power, for the support and encouragement of other men of letters. He chose to live with the great in that degree of independency and freedom which became a man possessed of a superior genius, whereof he was daily giving fresh proofs to the public. One of his last performances in polite letters, was his translation of the whole fourteenth book, and the story of Cinnus in the fifteenth book, of Ovid's *Metamorphoses*. These, together with an English version of the rest, were published in 1717; and he has

prefixed an excellent preface to the whole, wherein he not only gives an idea of the work, and points out its principal beauties, but shows the uses of the poem, and how it may be read to most profit. The distemper which seized him the ensuing year, and ended not but with his life, caused a general concern; which was particularly testified by lord Lansdown, brother-poet, though of a different party, in some admirable verses written on the occasion. He died, after a short illness, which he bore with great patience, in January 1719.

GARUMNA, a noble and navigable river of Gaul, which rising from the Pyrenees, formerly bounded Aquitaine on the north (Cæsar;) but by the new regulation of Augustus divided it in the middle, emptying itself, to the north of Burdegala, into the Aquitanic ocean. Now the *Garonne*. Mela observes concerning it, that unless it is swelled by winter rains, or the melting of the snow, it is for a great part of the year shoaly and scarce navigable: but when increased by the meeting tide, whereby its waters are repelled, it is somewhat fuller, and the farther the river advances, it is broader, till at length it resembles a large frith or arm of the sea; not only bearing large vessels, but also swelling like a raging sea, tosses them extremely, especially if the direction of the wind be one way and that of the current another.

GAS, a general name for all fluids of the aerial kind, excepting the common air we breathe. It is derived from the German *gascht* or *gas*, signifying an eruption of wind, or the ebullition attending the expulsion of elastic fluids from substances in a state of fermentation or effervescence. It was originally given by Van Helmont to the vapour of charcoal, the same with the fluid now called *fixed air*, and some other factitious airs; and from him has been employed by modern philosophers as a general term for all the fluids about which aerology is conversant.

Under the article *AEROLOGY*, the nature and properties of these fluids are explained at large; here, however, for the more easy comprehension of the subject, we shall give a list of these fluids, with a general account of the most remarkable particulars hitherto discovered concerning them. The gases, or permanently elastic fluids, as yet known, are,

1. Common or atmospheric air.
2. Fixed air.
3. Inflammable air.
4. Nitrous air.
5. Dephlogisticated air.
6. Vitriolic-acid air.
7. Marine-acid air.
8. Nitrous-acid air.
9. Fluor-acid air.
10. Vegetable-acid air.
11. Alkaline air.
12. Dephlogisticated nitrous air.
13. Sulphurated inflammable air.
14. Hepatic air.
15. Phlogisticated air.

The most remarkable properties of these are as follow.

1. *Atmospheric air* supports both animal and vegetable life; and surrounding the whole globe to a considerable height, is one of the great agents employed by nature for executing her most important purposes.

Garum
Gas.

Gas.

It is composed of one part of dephlogisticated air, and three or more of phlogisticated air.

2. *Fixed air* is produced in great plenty in all kinds of combustion. If the combustible body be set on fire in pure dephlogisticated air, the fixed air is proportionably pure; but if in the common atmosphere the produce is contaminated by the whole quantity of phlogisticated air contained in that portion of the atmosphere by which the combustion was supported, it proves fatal to animals in a very short time, but is favourable to vegetation. It is absorbed in considerable quantities by water, to which it communicates an agreeable acidulous taste, and a power of dissolving iron; and is the principal ingredient in mineral waters. It is taken up in great quantity by pure alkaline salts whether fixed or volatile; by calcined magnesia, lime, or calcareous earth; all of which it naturalizes, and forms with them salts of different kinds. Lime absorbs it more readily either when quite dry or entirely dissolved in water than when exposed to it in a moist mass, and lime-water is readily precipitated by it; but magnesia attracts it more readily when in a moist mass; and the fixed alkalies equally well in either case, unless when violently heated.

Fixed air is contained in great quantity in fermented liquors, to which it gives their agreeable taste and briskness; and by impregnating them with it, they may be recovered from a vapid state, and rendered brisk and agreeable as before. It has a considerable antiseptic power; and notwithstanding its pernicious qualities when taken into the lungs, has been found serviceable in putrid diseases when swallowed, or when injected by way of glyster. Being a natural product of combustion, it is met with in great quantities in the neighbourhood of volcanoes, or mountains which have formerly been volcanoes, where it often produces mischievous effects. It is also met with in mines, where it often proves fatal to the workmen. In the artificial way it is procured from fermenting liquors; from the calcination of magnesia and calcareous earths by heat; and from a mixture of these earths with acids, chiefly the vitriolic. When procured from large quantities of fermenting liquors, it lies in a large body on the surface of the liquor, generally nine inches or a foot thick, and affords an amusing appearance on extinguishing lighted candles or chips of wood in it. In these experiments the smoke readily unites with the gas, so that little or none of it can disperse itself into the atmosphere: and it is remarkable, that the upper surface of this smoke which floats in the fixed air is smooth and well defined, but the under part is ragged, and sometimes even collecting itself into balls connected with the upper surface by slender threads. Sometimes the smoke will form itself into broad flakes parallel to the surface of the liquor, and at different distances from it, exactly like clouds; and these appearances will continue for upwards of an hour with very little variation. Dr Priestley tried the smoke of gun-powder, rosin, sulphur, and other electric substances; and found them all retained equally by the fixed air, as well as the smoke of vitriolic acid raised by putting a burning coal in it.

Fixed air does not very readily unite with common air. It is near twice as heavy as atmospheric air, and acquires a proportionably greater elasticity by heat. It

Gas.

is composed of dephlogisticated air and phlogiston; which two ingredients are partly separated by the electric spark. It may be kept for any length of time in vessels inverted into quicksilver, or even into water, with a coat of oil about half an inch thick on its surface.

3. *Inflammable air* is composed of phlogiston and water rarefied by heat. It is the lightest fluid known in nature, being 10 or 12 times specifically lighter than the common atmosphere. It is pernicious to animals, but supports vegetable life. By itself it extinguishes flame; but when mixed with a certain quantity of common air, the whole explodes violently, and a small portion of nitrous acid is produced. If dephlogisticated air be used instead of common air, the explosion is much more violent; Dr Priestley says 50 times. It is very readily absorbed by the calces of some metals, particularly lead, to which it restores its metallic form; and is even decomposed by keeping it long in a tube made of white glass, to which it communicates a black colour by its attraction for the lead in its composition. It is produced naturally in coal-pits and other mines; where, being mixed with common air, and frequently inflamed by the lights which the miners have along with them, it explodes with prodigious violence, and often produces much mischief. Sometimes it rises out of marshes, or from the mud at the bottom of springs and rivers; in which case the water will seem to take fire on holding a lighted candle to its surface. It is produced from the vapours of rancid oil; whence it has sometimes been collected in the large bellows used in founderies, and burst them with explosion. It seems also to be a natural product of putrefaction of every kind, being sometimes met with in jakes and privies, where it has exploded as usual on the approach of a candle. When mixed with common air it may be fired by an electric spark, but less readily by one from flint and steel; though there are instances of its taking fire in this manner also. In the artificial way, it is most usually procured from iron-filings and diluted vitriolic acid; and lately from the steam of water conveyed over iron-filings through a red-hot tube. It is likewise obtained by distillation of wood, coal, &c. and by dissipating charcoal with the heat of a burning glass *in vacuo*. Dr Pennington of Philadelphia informs us, that it resists putrefaction; but its virtues in this way have not been particularly examined.

4. *Nitrous air* is produced from inflammable substances combined with the nitrous acid; and, according to that class of philosophers styled *Phlogistians*, consists of nitrous acid supersaturated with phlogiston; according to the *Antiphlogistians*, it consists of the same acid, deprived of a part of its oxygenous principle, the same with what the other party call the basis of dephlogisticated air. This is the most noxious of all the kinds of air hitherto discovered; being not only instantly fatal to animal life, but to vegetables also, as well as extinguishing flame in the most perfect manner. It has a strong offensive smell; and when mixed with a quantity of dephlogisticated or common atmospheric air, a very considerable diminution of the latter takes place, attended with heat, red fumes, and the production of nitrous acid. The diminution is greatest of all when pure dephlogisticated air is made use of; and with atmospheric air is greater or less, according to its degree of purity or the quantity of dephlogisticated air it contains. This

kind

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kind of air is a most powerful antiseptic; and has been tried, but without success, to preserve meat fresh for a long time; though for a week or two it might perhaps be useful. It is heavier than common air.

5. *Dephlogisticated air* supports animal life and flame in the most perfect manner, but is less friendly to vegetables; though it seems not to possess any property absolutely detrimental to them, further than as it contains none, or only a small quantity, of that phlogistic matter, which is now found to be the proper food of plants. The heat produced by it in burning bodies seems to be very little if at all inferior to that of a large burning mirror. It unites with water but in small quantity; but attaches itself strongly to iron when fired in it, causing the metal to burn with a bright flame, and being diminished by this combustion to a surprising degree. With other inflammable matters it produces fixed air. It is naturally found in sea-water, and rises in some waters through the earth. It is produced in the day-time by the leaves of many plants; but not in the night. It is also produced from water exposed to the sun's light, especially if certain substances be put into it, of which a particular account is given under the article AEROLOGY. It is also produced by the distillation of nitre, manganese, and other substances.

6. *Vitriolic-acid air* is not essentially different from the fumes of burning sulphur, only that the latter are always mixed with common air. It is very heavy, and destructive both to animal and vegetable life; extinguishing flame also; and uniting in large quantity with water, from which, however, it is easily expelled by heat. By virtue of its properties as an acid, it readily unites with alkaline salts. It dissolves also camphor, reducing it to a transparent liquor; from which, however, the camphor separates on the affusion of water. It is produced by distilling oil of vitriol mixed with inflammable substances with a gentle heat.

7. *Marine-acid air* is no other than the vapour of marine acid, which may be procured either by distilling the marine acid with a very gentle heat, or the mixture of vitriolic acid, and common salt usually made use of for procuring that acid. It is absorbed largely by water; so that a very strong and smoking acid liquor can thus be obtained. It is pernicious to animal and vegetable life, but less so than the two former. It likewise extinguishes flame: but a candle will burn in common air, though mixed with a large proportion of it; in which case the flame appears of a most beautiful blue or green colour.

8. *Nitrous-acid air* has been but little examined on account of its extreme corrosive property, by which it destroys all kinds of liquids wherewith we attempt to confine it. By the addition of a certain quantity of phlogiston it is converted into phlogisticated air, as Dr Priestley found on attempting to confine it by means of whale oil. It is absorbed by water, and forms nitrous acid; being the vapour of that, as the marine acid air is the vapour of the concentrated marine acid.

9. The *fluor-acid air* is not distinct from the vapour of that acid loaded with siliceous earth, which it plentifully dissolves. A full account of its properties is given under the article CHEMISTRY.

10. *Vegetable-acid air* was procured from an exceedingly concentrated acetous acid, but with more diffi-

culty than the others on account of the volatility of the liquid. It extinguishes flame, unites with alkalies, and performs every other thing that could be expected from the acetous acid, manifesting its inferior acid power even in its aerial state. It is very readily imbibed by water and by charcoal. It is likewise absorbed pretty readily by olive oil, on which it has a remarkable effect. The oil takes up about ten times its bulk of the air; and, from being of a yellowish colour, turns almost as clear as water, losing also somewhat of its viscosity, and approaching to the consistence of an essential oil.

A singular appearance was observed by Dr Priestley on attempting to determine how much of this air a certain quantity of water would imbibe. Having put the liquid into a glass tube closed at one end, and introduced it to the vegetable acid air, a small bubble of common air which appeared at the bottom began to expand, and continued to do so till all the water was thrown out of the tube. The same effect took place when the tube was hermetically sealed at the end. With spirit of wine it was the same, and with oil of turpentine the effect took place more quickly; but with olive oil it was more slow.

11. *Alkaline air* is lighter than that of the common atmosphere, and much more expandible by heat. It is now found to be composed of inflammable and phlogisticated air. It has all the properties of caustic volatile spirits, uniting with acids and forming neutral salts. It is obtained from a mixture of sal ammoniac and lime by distillation with a very gentle heat; or it may be had in great quantity by distilling spirit of wine with volatile alkaline spirit. It is inflammable when mixed with common air, but burns without any explosion.

12. *Dephlogisticated nitrous air* is produced from the nitrous kind exposed to liver of sulphur, or for a longer time to iron. It may also be produced directly in the operation for making nitrous air from the acid and iron. After a great quantity of nitrous air has been extricated from this mixture without heat, the dephlogisticated nitrous air will come over by the application of heat. It is remarkable for being able to sustain flame, without supporting animal life. In this kind of air a candle burns sometimes naturally, and sometimes with an enlarged flame of a blue or green colour. It is less proper as a test for the purity of the atmosphere than common nitrous air.

13. *Sulphurated inflammable air* is a late discovery of Dr Priestley's, and seems to be composed of inflammable and hepatic air mixed together.

14. *Hepatic air* is the steam which arises from liver of sulphur on the addition of water, but still more copiously on the addition of an acid. It is fatal to animal life, and burns without explosion. Its effect on vegetables is not well known; it is remarkable for the property of giving a black colour to some metallic calces, whence it has the property of rendering sympathetic ink visible.

15. *Phlogisticated air* is one of the component parts of the atmosphere; and is produced in great plenty by all the processes of putrefaction, calcination of metals, and many cases of combustion. It is very destructive to animal life, and likewise extinguishes flame; but it is exceedingly proper for the support of vegetables, which

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which thrive much better in it than in the common air. There are disputes concerning its composition; the Antiphlogistians supposing it to be a primary element, and their antagonists that it is composed in great part of phlogiston; though they have not been able to prove this part of their doctrine either by reviving the calces of metals, or purifying it in such a manner as to make it respirable. It is somewhat lighter than atmospheric air. Mixed with dephlogisticated and inflammable air, it produces nitrous acid by detonation. Inflammable, nitrous, and alkaline air, may be partly converted into it.

Having thus briefly recapitulated the properties of the different gases hitherto discovered, we shall next proceed to consider the apparatus necessary for making the various experiments with these gases, which have been for some time in so much repute among modern philosophers. These experiments may be reduced to the following classes. 1. The production and preservation of the gases themselves. 2. The impregnating water or other fluids with them. 3. Trying their effects upon animals and vegetables. 4. The effects produced on them by electricity. 5. Their capacities for conducting heat.

Where one can have access to large quantities of fermenting liquor, fixed air may be easily procured of tolerable purity, by filling a vial or tumbler with water, and then emptying it below the surface of the mephitic atmosphere which floats above the surface of the liquor, the fixed air occupying the place of the water as it is discharged from the vessel. It may then be preserved by stopping the mouth of the vial with a cork; or, if it is a wide-mouthed vessel, by inverting it in quicksilver, or in water covered with oil. In most cases, however, the different kinds of air may be for a short time preserved in vessels inverted in water alone without any oil. For experiments, therefore, on those kinds of airs which may be preserved in water, Dr Priestley made use of an oblong trough of wood, such as is represented, Plate CCVII. fig. 1. The dimensions were generally two feet in length, 18 inches in breadth, and 11 inches in depth. About an inch below the top is a wooden shelf all round, for the purpose of setting the inverted vials or jars of air upon it. The vessels he commonly made use of were such jars as he had been accustomed to use in his electrical batteries, about 10 inches long and $2\frac{1}{2}$ wide; though for different experiments he had them of various shapes and sizes. When he had occasion to remove vessels of air from the large trough, he put them into pots or dishes of the form represented fig. 2; these dishes being first put under water, and the jars then slid off the shelf upon them. For the mere removal of jars of air from one place to another, where they are to stand only for a few days, he makes use of common tea-dishes, which hold water enough, unless the air be in a state of diminution by any process going on in the vessel. When any thing, as a gallipot, is to be supported in a jar full of air, wire-stands, such as are represented fig. 3. may be conveniently made use of. They answer better than any others, on account of their taking up less room, and being easily bent into any shape. When there is occasion to pour a quantity of air from one vessel to another, a funnel, fig. 4. must be made use of. Thus the operation is rendered exceedingly

easy, by first filling the vessel in which the air is to be conveyed with water, and holding the mouth of it together with the funnel both under water with one hand, while the other is employed in pouring the air; which, ascending through the funnel up into the vessel, makes the water descend, and takes its place. It will be convenient to have several of these funnels of different sizes. They are best made of glass. An improvement on this part of the apparatus was made by the Duke de Chaulnes, and consists in having the under part of the shelf hollowed out into the shape of a funnel, with an hole over the middle, on which the vial is to be placed, and the air ascends without any trouble. When there is occasion to transfer air from a jar standing in the trough of water to a vessel standing in quicksilver, or any other situation whatever, the apparatus represented fig. 5. may be made use of. It consists of a bladder furnished at one end with a small glass-tube bent, and at the other with a cork perforated in such a manner as just to admit the small end of the funnel. When the common air is carefully pressed out of this bladder, and the funnel thrust tightly into the cork, it may be filled with any kind of air as easily as a glass jar. A string being then tied above the cork in which the funnel is inserted, and the orifice in the other cork closed by pressing the bladder against it, it may be carried any where; and if the tube be carefully wiped, the air may be conveyed quite free from moisture through a body of quicksilver or any thing else. When it is wanted to try whether a candle will burn in any kind of air, a cylindrical glass vessel, fig. 6. may be used, with a bit of a wax candle *a* fastened to the end of a wire *b*, and turned up in such a manner as to be let down into the vessel with the flame upwards. The vessel should be kept carefully covered till the moment the candle is admitted. In this manner, the Doctor tells us, he has frequently extinguished a candle more than 20 times successively; though it is impossible to dip the candle into it without giving the external air an opportunity of mixing more or less with that in the inside. The candle *c* at the other end is very convenient for holding under a jar standing in water, in order to burn as long as the inclosed air can supply it; for the moment that it is extinguished, it may be drawn through the water before any smoke can have mixed with the air. To draw the air out of a vessel which has its mouth immersed in water, and thereby to raise the liquid to any height that may be required, a glass syphon is very convenient, such as is represented, fig. 8. putting one of the legs up into the vessel, and drawing the air out at the other end by the mouth, or rather, as most of the gases have a noxious quality, by a syringe properly fastened to it. Dr Hales sometimes made use of a valve at the top of the vessel; but Dr Priestley does not think this can be altogether depended upon. If, however, a very small hole be made at the top of a glass vessel, it may be filled to any height by holding it under water while the air is issuing out at the hole, which is then to be closed with wax or cement. When the gas employed in the experiment is of such a nature that it will neither be absorbed by water, nor diminish common air, it may be convenient to put part of the materials which generate the gas into a cup, as at *f*, fig. 1. Then having, by means of a syphon,

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Fig. 7.

drawn the air to a convenient height, the small glass vessel may be easily pushed into the cup by a wire introduced through the water. The contents of the small vessel may be discharged into the larger by a variety of contrivances; and the distance between the boundary of air and water, before and after the operation, will show the quantity of the generated air. The effect of such substances as diminish air may also be tried by this apparatus. When air is to be admitted to any thing that will not bear wetting, and yet cannot be conveniently put into a vial, and especially if it be in the form of powder, and must be placed upon a stand (as in those experiments in which the focus of a burning mirror is to be thrown upon it), the receiver in which it is to be placed must first be exhausted; then having a glass tube bent for the purpose, as in fig. 9. it is screwed to the transfer of an air-pump on which the receiver had been exhausted; and introducing it through the water into a jar of air of that kind with which the receiver is to be filled, the purpose is gained by only turning the cock: but in this way, unless a great deal of care be taken, some common air is apt to get into the receiver. If it is wished to try the goodness of any particular kind of air, two measures of it must be put into a jar standing in water; and having marked on the glass the exact place of the boundary of the air and water, a measure of nitrous air is put to it; and after waiting a proper time, the quantity of its diminution is to be noted. If two kinds of air nearly alike are to be compared together after mixing them in a large jar, the mixture is transferred into a long glass tube, by which the scale can be lengthened as much as we please. When the quantity of air, the goodness of which we wish to ascertain, happens to be so small that it is contained in a portion of a glass-tube from which water will not run out, as *a* fig. 10. the length of the column of air in the tube is first to be measured with a pair of compasses, the remaining part being filled with water. The length of the column is then to be laid down upon a scale; and then thrusting into the tube a wire of a proper thickness *b*, it is drawn out again by means of a thin plate of iron bent to a sharp angle *c*, when the whole of this little apparatus has been introduced through the water into a jar of nitrous air, and the wire being drawn out, the air from the jar must supply its place. The length of this column of nitrous air is then to be measured, and laid down upon the scale, so as to know the exact length of both the columns. After this, holding the tube under water, the two columns of air are to be forced into contact by means of a small wire; and when they have been a sufficient time together, the length of the whole is measured and compared with the length of both columns taken together.

In many experiments, the matters from which air is to be expelled must be subject to a very considerable degree of heat. In these cases Dr Priestley frequently made use of a gun-barrel, fig. 11. Into this he put the substance from which the air was to be extracted; then filling it up with dry sand so that very little air could be lodged in the barrel, and having also previously burned the sand, so that no air could come from it, he luted to the open end the stem of a tobacco-pipe or small glass tube. Then having put the closed

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end of the tube which contains the materials into the fire, the generated air, issuing through the tube, may be received into a vessel of quicksilver, with its mouth inverted into a basin of the same, suspended all together by wires as represented in the figure. Any other fluid substance may be used instead of quicksilver.

The best method, however, of procuring air from several substances by means of heat, is to put them into vials full of quicksilver, with their mouths immersed in the same, and then throwing the focus of a burning mirror upon them. For this purpose the vials should have round bottoms very thin, that they may not be liable to break on any sudden application of heat. If it is wanted to expel air from any liquid, a vial is to be nearly filled with it; then having a cork perforated, a bent glass-tube is put through it and secured with cement, represented at *e*, fig. 1. The vial is then put into a kettle of water, which is set upon the fire and made to boil. The air expelled by the heat issues through the tube, and is received in the basin of quicksilver, fig. 11. But instead of this suspended basin, the simple apparatus of a flaccid bladder, tied to the end of the tube in order to receive the generated air, may sometimes be advantageously made use of. To produce air by the solution of metals, or any similar process, the materials are to be put into a vial prepared in the manner represented at *e*, fig. 1. and the end of the glass-tube put under the mouth of any vessel into which it is wanted to convey the air. Heat may be easily applied while it hangs in this position, by means of a candle or red-hot poker.

In making experiments on such kinds of air as are readily imbibed by water, quicksilver must always be made use of, as represented fig. 12. where *a* is the basin of quicksilver, *b* a glass vessel containing quicksilver with its mouth immersed in it, *c* a vial containing the ingredients from which the air is to be produced, and *d* a small recipient or glass vessel to intercept any liquor that may come over along with the air, which must be transmitted as free from moisture as possible into the vessel *b*. If there be no danger of moisture, however, the glass-tube only is made use of in the manner represented at *a*, fig. 1. To invert the vessel *b*, fig. 12. it must first be filled with quicksilver, and its mouth then carefully covered with a piece of soft leather; after which it may be turned upside down without any danger of admitting the air; and the leather may be withdrawn when it is plunged into the quicksilver.

The figures *aaa*, fig. 13. represent a kind of vials much used by Dr Priestley in all his experiments. They are made round and very thin at the bottom; and the mouth is to be ground smooth, so that they may be either used with a cork, or will stand firm when inverted after being filled with quicksilver or any other fluid. When used as common vials with corks, they will bear the application of a sudden heat without breaking, much better than the common vials which are thickest at the bottom. These vessels are particularly useful in extracting air from any substance confined by quicksilver: for, standing with their mouths downwards, and the substances with which the experiment is made lying upon the surface of the metal, just under the thinnest part of the glass, they are easily subjected to the action of a burning-glass without any danger of breaking the vial which contains them. Care must be taken,

taken, however, not to put them at once into the very focus, lest the glass should give way. In most cases this moderate heat will produce a considerable quantity of air; by which means there will be some space left between the glass and the substance from which the air is to be extracted, so that the greatest heat of the glass may easily be directed upon the substance itself, independent of the glass, which contains it; whence the latter is in no danger of being broken or melted. "A skilful operator (says Dr Priestley) will be able to fill his vessel with the newly generated air by this means: but in general, he will do well to content himself with getting it half-full, or less; for as the glass is necessarily thicker towards the mouth, there will be some danger of breaking it when the rays are transmitted near that place, and of losing the air that has been perhaps with great trouble and difficulty procured. If the substance on which the experiment is made be in the form of a powder, such as red-lead, and even many very light substances, it will be most convenient to put them into the vessel first; and the quicksilver may, with care, be poured upon them afterwards, so as to keep the substance at the bottom; and yet when the vessel is inverted it will remain uppermost. When the light matter will not lie close, it will not be difficult sometimes to intercept it in the strait part of the vial at the neck; but it will often be most convenient to form these light matters into small balls, and put them into the vessel through the quicksilver with which it has been previously filled. I would observe with respect to this process, and every other in which vessels are to be filled with quicksilver, and then to be placed inverted in basons of the same, that no operation is easier (unless the mouth of the vessel be exceedingly wide) when the mouth of it is covered with soft leather, and, if necessary, tied on with a string, before it be turned upside down; and the leather may be drawn from under it when it is plunged in the quicksilver. If the mouths of the vessels be very narrow, it will be sufficient, and most convenient, to cover them with one's finger. In this process there remains less doubt of the generated air coming from the materials on which the experiment is made, than when the focus of the lens is thrown upon them in vacuo; because there will often be room to suspect, that common air may get into the receiver in the course of a long process, at some place not sufficiently guarded; and besides it is a great satisfaction to see the quantity of air that is generated at any particular time, during the course of a process, that the operator may stop when he sees he has got a quantity sufficient for his purpose, whereas unless he has a gage connected with his transferer (which may be inconvenient), he must admit water into his receiver before he can certainly tell whether he has obtained any air or not; and then it will be liable to be affected by the water, or by the air contained in the water, and which will be set loose very copiously on its first admission into the receiver. But in cases where the air is apt to corrode the quicksilver, which always happens when the nitrous acid is concerned, recourse must then be had to the vacuum: and for this purpose it is necessary to have the receivers made as thin as possible, the thick ones being very apt to break by the heat of the lens. Care must be taken in those experiments to place the materials

on a crucible, a piece of glass, or some substance of that kind which yields no air."

Gas.

A vial, with a ground stopper, having the latter perforated with a number of small holes, will be found of excellent use to convey any liquid, or even any kind of air contained in it, through the water into a jar standing with its mouth inverted in the liquid, without admitting any mixture of common air or even of the water, and yet the generated air will have a sufficient outlet. Fig. 14. *c*, represents a kind of vial of the same form with those shown at *aaa*, fig. 13. but fitted with a ground stopper terminating in a tube, and which is occasionally to be used instead of that marked *c*, fig. 1. In most cases this is preferable to the corks and tubes the Doctor formerly employed; but in some the latter are still to be preferred, particularly where the fluor acid is to be used, which would soon corrode any of those thin vials. For experiments with this acid, therefore, the Doctor recommends the use of common vials made very thick, especially as no great degree of heat or sudden application of it is ever wanted. The vial *c* will be found sufficient for any purpose that does not require more heat than can be given by the flame of a candle held close to the bottom of it; but if there be occasion to place the vial in a sand-heat, and consequently if it must be put into a crucible placed on the fire, it will be necessary to have the tube in which the ground stopple terminates made as long as possible, that the vessel which receives the air may not be too near the fire. Nine or twelve inches will be a sufficient length for the purpose. In such experiments, however, as are not worth the expence of these vials and stoppers, and yet where gun-barrels cannot be safely trusted, the Doctor has recourse to a vial made narrower at the open end than the other, of about 9 or 12 inches in length, and of an equal thickness throughout. When these vials are put into a crucible with sand, the bottom may be made red-hot, while the top is so cold that a common cork into which a glass-tube is inserted will not be affected by the heat. When the materials are put into this vessel, it must be filled up to the mouth with fine sand that will give no air by the application of heat; and the cork must be thrust close down upon the sand. The air is to be received in the same manner as directed for the gun-barrel.

For the purpose of making a quantity of air pass through a body of water or any other fluid, it is convenient to have a number of vials of the form represented fig. 15. the tube which conveys the air into the vial going nearly to the under part, and that which delivers it perforating only the upper part. Thus the air is forced to go through the whole body of the water or powder with which the vial may be filled. These vessels may be of various sizes, from a pint down to half an ounce; the larger end may generally be stopped with a cork, though in some cases it will be necessary to have this stopper also of glass, with only two perforations for inserting the tubes. Sometimes he had occasion to use a number of these vessels placed together, as represented fig. 16. that the same air might pass through them all; and sometimes it was found improper to use any kind of lute or cement, so that all the stoppers, large as well as small, were fitted by grinding; which made the apparatus very expensive.

Gas. pensive. The long vial annexed to this apparatus was chiefly made use of where the nitrous acid was concerned. It was made deep in order to admit of a sudden and violent effervescence without any danger of the liquid being thrown over; and the tube proceeding from it ought to be long enough to go to the bottom of any vessel in which the vapour is to be delivered.

Plate CCVIII. Fig. 17. represents a simple apparatus, being no other than a frame of wood so disposed about a vessel containing quicksilver, that the latter may admit of several glass tubes which support themselves against its sides, and thus may be employed in experiments all at the same time.

Fig. 18. shows a cylindrical vessel of tin perforated with holes, and enclosing another of iron wire. A charcoal fire may be made in the outer one, while a vial containing any quantity of air which it is wished to heat may be put within the frame of iron wire. Thus an equable heat will be produced on every part of the glass, without heating the bottom more than the rest; which in many cases is greatly to be wished for.

** Sec Water.* Fig. 19. shows the apparatus by which were made the principal experiments relating to the apparent conversion of water into air, on which Dr Priestley bestowed considerable attention, tho' he found it at last to be a mistake*. It consists of an earthen vessel; the bulb of which, containing moistened clay, is fixed in the inside of a glass vessel, through which the heat of a burning lens may be thrown upon it; while the inside has a communication with a basin of water or of quicksilver, in which vessels may be placed to receive the air that is forced through the body of the earthen vessel, while the water or mercury in the basin in which the glass stands rises to supply its place.

Fig. 20. shows the apparatus for transmitting steam through a red-hot tube containing iron or other substances. The contrivance is evident from an inspection of the figure; only the vessel which receives the air must be much larger in proportion than is here represented. Instead of the small furnace, one of Argand's lamps may be advantageously used. Fig. 21. shows a method of receiving the air under a funnel, when large balloons are to be filled for the purposes of aërostation.

These are the principal parts of the apparatus used by Dr Priestley in his numerous experiments for the production of airs, of all different kinds, from a vast variety of substances, and for preserving, transferring, or mingling them with one another as occasion required. On this part of his apparatus no improvement of any consequence has ever been made. It has been otherwise, however, with the method he proposed for impregnating water with the various gases, especially fixed air, which for some time engrossed a considerable share of the public attention. In this operation a principal requisite is to expose as large a surface of the water as possible to the action of the air; for it is only in proportion to the expanded surface, and not to the depth of the liquid, that the air is taken up. It is also requisite to save the air as much as possible, by stopping every outlet, and at the same time to prevent the vessels from bursting, which they might otherwise be apt to do. The first apparatus invented by Dr Priest-

ley, and which seems to have also been the first ever made use of by any person, is represented fig. 22. It consists of a glass vessel *a*, with a pretty narrow neck, but so formed that it will stand with its mouth downwards; and having filled it with water, lay a slip of clean paper or thin pasteboard upon it: then if they be pressed close together, the vessel may be turned upside down without danger of admitting common air into it; and when it is thus inverted, it must be placed in another vessel in the form of a bowl or basin *b*, with a little water in it, so much as to permit the slip of paper or pasteboard to be withdrawn, and the end of the pipe *c* introduced. The pipe used by the Doctor was at first made of leather, that by means of its flexibility he might be able to shake the vessel *d* containing the effervescing mixture; but afterwards he found it more convenient to use one of glass, making use of two bladders instead of the one represented in the figure at *d*. These two are joined together by a perforated cork, and give room enough for shaking the vessel, which one would scarcely admit of. Having put the oil of vitriol to the calcareous earth in the bottle *e*, the fixed air will very soon distend the bladder or bladders *d*, which must then be pressed out into the vessel *a*, but will not suddenly be absorbed by it. A quantity proportionable to the bulk of the air will therefore descend into the basin; and after the bottle *a* has thus been about half emptied, it will be necessary to shake it briskly; when the agitation will cause the air to be imbibed, and the water will reascend into the bottle. This is to be repeated till the water will not take up any more; after which it ought to be put into a bottle well corked and cemented; the air being very apt to escape after being once taken up.

Though this apparatus must evidently answer the purpose of impregnating water with fixed air very effectually, yet it is troublesome on account of the attendance required; and objections were also made to the use of bladders in it, as being apt to communicate a disagreeable taste to the liquor. The latter objection was particularly insisted upon by Dr Nooth; who from his own experience declared, that the use of them communicated some degree of urinous flavour to the impregnated water. Dr Priestley made light of this objection, but allowed the validity of that from the attendance necessary during the impregnation. Though he reckoned Dr Nooth's apparatus therefore inferior to his own with regard to its power, and tho' slower in its operation as well as more expensive, he constantly used it himself in his after experiments; and it has now become almost universally employed for the purpose of impregnating small quantities of water with this kind of gas.

Dr Nooth's apparatus, with some improvements in it by Mr Parker, is represented fig. 23. and is all made of crystal glass. The lowermost vessel contains the chalk and diluted oil of vitriol; the middle one the water to be impregnated; and the upper one is designed to give vent to such part of the air as cannot be imbibed. The air is admitted to the water through a number of holes, so small that the water cannot get through them on account of the resistance made by the ascending gas. The uppermost vessel is filled to a certain height with water, which is prevented from descending into the middle vessel by the resistance of the

air

air in the empty part. As the gas ascends, that part of it which is not condensed compresses the water, and forces it up into the upper vessel, leaving thereby a greater space for the air to expand in; at the same time that a considerable pressure is made by the weight of the incumbent water, which very much promotes the absorption of this or any other gas. The effervescing materials may be renewed, and the water drawn off, by the cocks represented in the figure. Fig. 24. shows a farther improvement upon this apparatus by Mr Blades of Ludgate-hill. The only difference is in the shape of the vessels, and having a glass cock for letting off the impregnated water, instead of a tube closed with a cork.

Another apparatus, capable of answering the purpose at least as well as that of Dr Nooth, and much less expensive, was invented by Dr Withering, and is represented fig. 25. A, is a glass-vessel about 10 inches high in the cylindrical part, and $6\frac{1}{2}$ inches diameter. B, a glass-vessel about 12 inches high in the conical part, $1\frac{1}{2}$ in the neck, and 5 inches diameter at the bottom. C, a copper pipe passing through the stopper of the vessel B, and tied fast into the flexible tube D. This tube is made of strong leather, and kept hollow by means of a spiral wire running through its whole length. E, a conical brass-pipe, with a stop-cock fastened to the tube D. F, a conical pipe, with a stop-cock G; having the end of the tube E accurately ground to it so as to be air tight. G, the stop-cock cutting off all communication with the atmosphere when the pipe E is removed. H H, two large hog's bladders, each of which ought to contain two quarts. I, a stop-cock to prevent the water from rising into the bladders when the vessel A is agitated. K, a bladder tied to the crooked tube with the stop-cock L, which occasionally opens or shuts the communication with the vessel B. M, a glass funnel accurately fitted with the glass-stopple N. O, the aperture fitted with a glass-stopper, from which the impregnated water is to be drawn for use; or, instead of the glass-stopper, a silver-cock may be more conveniently applied. P, the tube opening into the vessel A.

To make use of this apparatus, we must, 1. Fill the vessel A with pure water, adding such other ingredients as are necessary along with the gas. The vessel is calculated to hold five quarts conveniently for impregnation. 2. Put into the vessel B as much marble or whiting in small lumps as will cover its bottom to the height of two inches, then pour in water to the height represented by the dotted line. 3. Let all the bladders be tied round their respective tubes, so that they may be perfectly air-tight. 4. Fit the mouth of the vessel A tight with a cork, and through a hole in this pass the tube P; putting on the cork some sealing-wax of the softest kind, or else modelling wax, so that the whole may be made air-tight. 5. Stop the mouth of the vessel B with a piece of mahogany prepared in the following manner. Let the wood be first turned in a lathe of a conical figure, but a little larger than the mouth of the glass will admit. Put this piece of wood into melted bees-wax, and heat the wax until the wood begins to grow black. When cool, turn it again in a lathe until it fits the mouth of the vessel. The tubes C, L, and M, are fitted into holes bored

through the wooden stopper previous to its being immersed in the melted bees-wax. 6. Push these tubes through their respective holes in the wooden stopper; press their stopper into the orifice of the vessel B, and cement the whole with sealing or modelling wax. 7. Shut the stop-cocks I and L, having previously pressed the air out of the bladder K; open the stop-cocks G and E; then squeeze the air out of the bladder H H; and afterwards press the conical pipe E into the pipe F. 8. Pour about a large spoonful of oil of vitriol through the funnel M, and stop it with its stopper N: on this the fixed air rising through the tube C passes into the bladders H H, and distends them. 9. When the bladders are distended, open the stop-cock I, and draw off about a quart of water from the aperture at O. The empty space left by the water will quickly be filled with gas, which the remaining water will begin to absorb, and the absorption will still be supplied by fresh gas from the bladders; for which reason these must be kept pretty fully distended, by adding more oil of vitriol when they begin to grow flaccid. 10. If it be required to impregnate the water quickly, turn the stop-cocks at G and E, and open that at L; then separate the pipe E from the tube F, and agitate the vessel A. During this time the fixable air that is produced passes into the bladder K, from whence it may be afterwards pressed into the other bladders when the parts of the apparatus are again united. 11. During the agitation close the stop-cock at I, opening it only occasionally to replace from the bladders H H the air absorbed by the water. 12. If a strong impregnation be desired, the temperature of the room where the operation is carried on ought not to be more than 48° of Fahrenheit. 13. That the cocks may continue perfectly air-tight, it will be necessary to supply them once a-year with a very small quantity of unsalted lard. Modelling wax, of which mention is made in this description, may be made by adding two ounces of tallow and one of turpentine to half a pound of bees-wax. It may be coloured with red-lead or Spanish-brown; and the mixture must be kept stirring till cold.

These are the principal discoveries which have yet been made concerning the method of impregnating water with fixed air, and they may undoubtedly be applied to the impregnation of that fluid with any other kind of gas which it will take up; only it must be observed, that where any of the acids are concerned, that of fluor alone excepted, there is an absolute necessity for having all parts of the apparatus made of glass.

For making experiments on vegetables, the large cylindrical glass, fig. 2. is very proper. When it was wished to try how long a small animal would live in a certain quantity of air, Dr Priestley found a large beer-glass, such as is represented at d, fig. 1. very convenient. The animals he most commonly made experiments upon were mice; and in a beer-glass containing between two and three ounces, he found that one of these creatures would live 20 minutes or half an hour. To obtain mice for such experiments, he directs that they should be caught in wire-traps, from whence they may be easily taken. To get them into the air, they must be passed through the water into the vessel containing it. The wet they sustain on this occasion does

Plate
CCVII.

Gas.

them no hurt; but if the air is of such a quality that it is expected the mouse can live any time, it must have something to sit upon out of the reach of the water. Where this is not the case, it will be proper to hold the animal by the tail, in order to withdraw it as soon as possible; but if the air has been thoroughly noxious, it will be irrecoverable by a single inspiration. The mice are kept in receivers open at top and bottom, standing upon plates of tin perforated with many holes, and covered with others of the same kind to admit the air, kept down with weights, as in fig. 26. A quantity of paper or tow must be put into the vessel, and changed every two or three days in order to clean it; for which purpose it is proper to have another receiver of the same kind ready cleaned to hold them in. These animals must be kept in a place of a moderate temperature, either too much heat or too much cold being prejudicial to them. The place where Dr Priestley kept his had a temperature of about 70° of Fahrenheit. When they had been made to pass through water, it was necessary to give them a considerable degree of heat in order to dry and warm them. In the course of his experiments he found, that mice will live entirely without water; for though he kept them for three or four months, and several times offered them water, they would never taste it; notwithstanding which they continued in perfect health and vigour. Two or three of them will live very peaceably together in the same vessel; though the Doctor had one instance of a mouse tearing another almost in pieces, when there was plenty of provisions for both.

Some difficulty may occur in opening the mouth of a phial containing any kind of substance to which water must not be admitted in a jar of air: but this will easily be overcome, by having a cork cut tapering with a strong wire thrust through it, as in fig. 27. for thus it will easily fit the mouth of any phial; and by holding the phial in one hand, and plunging both into the trough of water, the phial can easily be conveyed through the water into the jar; which must either be held by an assistant, or be fastened by strings with its mouth projecting over the shelf. When the phial is thus conveyed into the jar, the cork may easily be removed, and put in again at pleasure.

Plate
CCVIII.

Fig. 28. represents an apparatus for determining the conducting power of air with regard to heat. It consists only of a jar, which may be filled with any kind of air, with a very sensible thermometer inserted in it, as is represented in the figure. The scale of this was so large, that the Doctor could mark upon it 20 divisions, each larger than half an inch, between the mean temperature of the atmosphere and a heat much below that of boiling water. By frequent trials he at last adjusted it in such a manner, that having filled the vessel with any kind of air, he could plunge it first in hot and then in cold water, so that the mercury would rise to the division 20 and fall to that of 6 or 7 in no great time; and thus, by means of a clock which beat seconds, he could not well make a mistake of more than two in noting down any particular division. The hot water was always made to boil, and the cold water was always brought fresh from the same pump. The mouth of the air-vessel was placed in a cup of mercury kept always at the same

height; so that he could thus try any kind of air with as much accuracy as one would think were possible. Notwithstanding this, however, he could not thoroughly satisfy himself with the results; at least he has not yet thought proper to publish fully the results of his experiments. The differences, he says, were less striking than he expected. Inflammable air, however, appeared to conduct heat better than any other; the mercury ascending the same space in half the time in it that it took up in common air. Fixed air, and all the acid airs, were considerably worse than common air. Alkaline air was a little better, and dephlogisticated air a little worse, than common air; but the result of this last experiment was uncertain.

The electric spark is easily taken in any kind of air by filling a small tube with the air desired, with two wires approaching within striking-distance of each other in the middle.

We shall close this account of the apparatus for making experiments on gases with an account of an instrument invented by Dr Pearson of London for collecting air of any kind which escapes in bubbles from the surface of springs or rivers. It consists of a funnel inserted into a phial in such a manner that the gas as it issues through the water may come under the funnel, and thus rise into the phial. For the convenient holding it to receive the air from any place where it may issue copiously, it is furnished with a handle and a ring, to which the funnel is tied by springs, as represented fig. 29.

GASCOIGNE (Sir William), chief justice of the court of king's bench under Henry IV. A most learned and upright judge: who being insulted on the bench by the then prince of Wales, afterwards Henry V. with equal intrepidity and coolness committed the prince to prison; and by this seasonable fortitude laid the foundation of the future glory of that great monarch, who from this event dated his reformation from the licentiousness of his youth. It is not well authenticated that the prince struck Sir William, as recorded by Shakespeare; but all authors agree, that he interrupted the course of justice to screen a lewd servant. Sir William died in 1413.

GASCOIGNE (George), an English poet of some fame in the early part of the reign of queen Elizabeth, was born at Walthamstow in Essex; of an ancient family, and educated at both universities, but principally at Cambridge. From thence he removed to Gray's Inn, and commenced student of the law; but having a genius too volatile for that study, he travelled abroad, and for some time served in the army in the Low Countries. He afterwards went to France; where he became enamoured of a Scottish lady, and married her. Being at length, says Wood, *weary of those vanities*, he returned to England; and settled once more in Gray's Inn, where he wrote most of his dramatic and other poems. The latter part of his life he spent in his native village of Walthamstow, where he died in the year 1578. He had the character of a polite gentleman, an eloquent and witty companion, *et vir inter poetas sui seculi præstantissimus*. His plays, first printed separately, were afterwards, with several other poems, &c. reprinted in two volumes 4to; the first volume in 1577, the second in 1587.

GASCOIN,

Gas,
Gascoigne.

Gascoin
||
Gassendi.

GASCOIN, or **GASCOIGN**, denotes the hinder thigh of a horse, which begins at the stiffe, and reaches to the ply or bending of the ham.

GASCONADE, a boast or vaunt of something very improbable. The term has its rise from the Gascoons, or people of Gascony in France, who it seems have been distinguished for bragging and rhodomontado.

GASCONY, the most south-west province of France, is bounded by Guienne on the north, by Languedoc on the east, by the Pyrenees which separate it from Spain on the south, and by the Bay of Biscay on the west. It had its name from the ancient inhabitants called *Gascones*, or *Vascones*; by the moderns *Basques*, or *Vasques*. After these were subdued by the Franks, they had for some time dukes of their own, who were subject to the dukes of Aquitaine; but both were at last dispossessed by the kings of France. The country produces corn, wine, fruits, tobacco, hemp, brandy, prunes, &c. The inhabitants are noted for a corrupt and vicious pronunciation of the French tongue, as well as their vain-glorious boasting.

GASSENDI (Peter), one of the most celebrated philosophers France has produced, was born at Chanterrier, about three miles from Digne in Provence, in 1592. When a child, he took particular delight in gazing at the moon and stars as often as they appeared in clear unclouded weather. This pleasure frequently drew him into bye-places, in order to feast his eye freely and undisturbed; by which means his parents had him often to seek, not without many anxious fears and apprehensions. They therefore put him to school at Digne; where, in a short time, he made such an extraordinary progress in learning, that some persons, who had seen specimens of his genius, resolved to have him removed to Aix, in order to study philosophy under Fesay, a learned minor friar. This proposal was so disagreeable to his father, who intended to breed him up in his own way to country business, as being more profitable than that of a scholar, that he would consent to it only upon condition that he should return home in two years at farthest. Accordingly young Gassendi, at the end of the appointed time, repaired to Chanterrier: but he had not been long there when he was invited to be professor of rhetoric at Digne, before he was quite 16 years of age; and he had been engaged in that office but three years, when his master Fesay dying, he was made professor in his room at Aix. When he had been there a few years, he composed his *Paradoxical Exercitations*; which, coming to the hands of Nicholas Peiresc, that great patron of learning joined with Joseph Walter prior of Valette in promoting him; and he having entered into holy orders, was first made canon of the church of Digne and doctor of divinity, and then obtained the wardenship or rectorship of that church. Gassendi's fondness for astronomy grew up with his years; and his reputation daily increasing, he was in 1645 appointed royal professor of mathematics at Paris. This institution being chiefly designed for astronomy, our author read lectures on that science to a crowded audience. However, he did not hold this place long; for a dangerous cough and inflammation of the lungs obliged him, in 1647, to return to Digne for the benefit of his native air.—Gassendi wrote against the metaphysical meditations of

Des Cartes; and divided with that great man the philosophers of his time, almost all of whom were Cartesian or Gassendians. He joined to his knowledge of philosophy and the mathematics an acquaintance with the languages and a profound erudition. He wrote, 1. Three volumes on Epicurus's Philosophy; and six others, which contain his own philosophy. 2. *Astronomical Works*. 3. *The Lives of Nicholas de Peiresc, Epicurus, Copernicus, Tycho Brahe, Puerbachius, and Regiomontanus*. 4. *Epistles, and other treatises*. All his works were collected together, and printed at Lyons in 1658, in six volumes folio. He died at Paris in 1655, aged 63.

GASTEROSTEUS, the **STICKLE-BACK**, in ichthyology, a genus of fishes belonging to the order of thoracici. There are three rays in the membrane of the gills; the body is carinated; and there are some distinct prickles before the back-fin. There are 11 species distinguished by the number of prickles on the back. One of these species, the aculeatus, stickleback, banticle, or sharpling, is common in many of the British rivers. In the fens of Lincolnshire, and some rivers that proceed from them, they are found in prodigious quantities. At Spalding there are once in seven or eight years amazing shoals that appear in the Welland, and come up the river in form of a vast column. They are supposed to be the multitudes that have been washed out of the fens by the floods of several years, and collected in some deep hole, till overcharged with numbers, they are periodically obliged to attempt a change of place. The quantity is so great, that they are used to manure the land, and trials have been made to get oil from them. A notion may be had of this vast shoal, by being informed, that a man being employed by the farmer to take them, has got for a considerable time four shillings a-day by selling them for a half-penny per bushel.—This species seldom reaches the length of two inches; it hath three sharp spines on the back, that can be raised or depressed at pleasure. The colour of the back and sides is an olive-green; the belly white; but in some the lower jaws and belly are of a bright crimson.

GAST-HOUND. See *GAZE-Hound*.

GASTRELL (Francis), bishop of Chester, was born in 1662, appointed preacher to the society of Lincoln's Inn in 1694, and made bishop of Chester in 1714. He preached a course of sermons for Boyle's lectures; engaged in the Trinitarian controversy with Mr Collins and Dr Clarke; and published two excellent pieces, the one, intitled, *Christian Institutes*, and the other, *A Moral Proof of a Future State*. He vindicated the rights of the university of Oxford against the archbishop of Canterbury, in the appointment of the warden of Manchester college; and opposed the violent proceedings against bishop Atterbury in the house of lords, though he disliked the bishop as a man of arbitrary principles. He died in 1725.

GASTRIC, in general, something belonging to the stomach.

GASTRIC-Juice, a thin pellucid liquor, which distils from certain glands in the stomach, for the dilution, &c. of the food. See *ANATOMY*, Sect. XIII.

GASTROCNEMIUS, in anatomy. See *ANATOMY*, *Table of the Muscles*.

GASTROMANCY, or **GASTROMANTIA**, a kind of divination.

Gastero-
steus

Gastro-
mancy.

Gastro-
raphy
||
Gate.

divination practised among the ancients by means of words coming or seeming to come out of the belly.

The word is Greek, *γαστρομαντεία*, composed of *γαστρ* belly, and *μαντεία* divination.

There is another kind of divination called by the same name *gastronomy*, which is performed by means of glasses or other round transparent vessels, within which certain figures appear by magic art. It is thus called, because the figures appear as in the belly of the vessels.

GASTRORAPHY, in surgery, the operation of sewing up wounds of the abdomen. See SURGERY.

GASTROTOMY (of *γαστρ*, and *τομή*, I cut), the operation of cutting open the belly; otherwise called the *Cæsarian section*. See MIDWIFERY.

GATAKER (Thomas), a learned critic and divine, was born at London in 1574, and studied at St John's college, Cambridge. He was afterwards chosen preacher at Lincoln's Inn; which he quitted in 1611, for the rectory of Rotherhithe in Surry. In 1620, he made a tour through the Low Countries; and in 1624, published at London a book, intitled, *Transubstantiation declared by the Confession of the Popish Writers to have no necessary foundation in God's Word*: he wrote likewise a defence of this discourse. In 1642, he was appointed one of the assembly of divines, and was engaged with them in writing annotations upon the Bible. He died in July 1654, in the 80th year of his age. Besides the above works, he published, 1. A Dissertation upon the Style of the New Testament. 2. *De nomine tetragrammata*. 3. *De dipthongis, five bivocalibus*. 4. An Edition and Translation of the Emperor Marcus Antoninus's Meditations. 5. A Collection of Sermons, in folio; and many other works. His piety and charity were very exemplary; and his modesty so great, that he declined all ecclesiastical dignity and court-preferments. His extensive learning was admired by Salmasius and other great men abroad; his house was a private seminary for young gentlemen of this nation, and many foreigners resorted to him to receive advice in their studies.

GATE, in architecture, a large door, leading or giving entrance into a city, town, castle, palace, or other considerable building. See ARCHITECTURE.

Thebes, in Egypt, was anciently known by the appellation *with a hundred gates*. In ancient Rome there was a triumphal gate, *porta triumphalis*. In modern Rome there is the *jubilee gate*, which is only opened in the year of a grand jubilee.

The gates of London were many of them converted into gaols or prisons, as Ludgate, Newgate, &c. but they are now removed. The lesser or by-gates are called *posterns*. Gates, through which coaches, &c. are to pass, should not be less than 7 feet broad, nor more than 12; the height to be $1\frac{1}{2}$ the breadth.

GATE, or GAIT, in the manege, called in French *train*, is used for the going or pace of a horse.

GATE, in a military sense, is made of strong planks, with iron bars, to oppose an enemy. They are generally made in the middle of the curtain, from whence they are seen, and defended by the two flanks of the bastions. They should be covered with a good ravelin, that they may not be seen or enfiladed by the enemy. These gates, belonging to a fortified place,

are passages through the rampart, which may be shut and opened by means of doors and portcullis. They are either private or public.

Private gates are those passages by which the troops can go out of the town unseen by the enemy, when they pass to and from the relief of the duty in the outworks, or on any other occasion which is to be concealed from the besiegers.

Public gates are those passages through the middle of such curtains, to which the great roads or public ways lead. The dimensions of these are usually about 13 or 14 feet high, and 9 or 10 feet wide, continued through the rampart, with proper recesses for foot passengers to stand in out of the way of wheel-carriages.

GATES of Hell. This expression is used in scripture, to denote figuratively either the *grave* or the *powers of darkness*, i. e. the devil and his angels.

The Mahometans use the expression literally, and suppose that hell has seven gates. The first is that where Mussulmans, who incur the guilt of sin, will be tormented. The second is for the Christians. The third is for the Jews. The fourth for the Sabians. The fifth for the Magians or worshippers of fire. The sixth for Pagans and idolaters. And the seventh for hypocrites, who make an outward show of religion, but have none.

GATESHEAD, in the county of Durham, is as it were the suburbs of Newcastle, though it lies in another county, being divided by the river Tyne; over which there is a fine stone-bridge, with an iron-gate in the middle, having the arms of Durham on one side, and those of Newcastle on the other, which is the boundary between the bishoprick and Northumberland. The church is a fine building, with a very high tower, seen at a great distance; and in the churchyard are several ancient monuments. There are few traces left of its ancient monastery, except a stone gateway, or rather a modern erection. The house covered two acres and a half of land. Here live the coal-pit men.

GATH, or GETH (anc. geog.), a celebrated city of the Philistines, and one of their five principalities. It is famous for having given birth to Goliath. David made a conquest of it in the beginning of his reign over all Israel; and it continued subject to the kings his successors till the declension and decay of the kingdom of Judah. Rehoboam rebuilt or fortified it; king Uzziah retook it, and Hezekiah once more reduced it under his subjection.

Gath stood about five or six miles from Jamnia, about 14 south of Joppa, and 32 west of Jerusalem. Hence some authors (among whom is F. Calmut) have committed an egregious mistake in making Gath the most southern, and Ekron the most northern, of the Philistine cities; as if these two had been the two boundaries of their dominions, whereas these two cities are not above five miles asunder; and Gaza is the last of the five satrapies south. And Josephus (in the place already quoted) expresses himself plainly enough, when he says, that Hezekiah took all the Philistine cities from Gaza to Gath; there being many more cities of that name, which signifies in the Hebrew a *wine-press*. Several more of the name of Geth or Gath are mentioned in Eusebius and St Jerom, whose situation,

Gate
||
Gath.

Gath
||
Gauden.

situation, according to them, plainly shows them to have been different places from this, and from each other; besides those which had an adjunct to distinguish them.

This city recovered its liberty and lustre in time of the prophets Amos and Micah; but was afterwards demolished by Hazael king of Syria, since which it became of but little consideration till the time of the holy war, when Fulk king of Jerusalem built a castle on its ruins.

GATH-Opher, *GATH-Epher*, or *Gath*, in the canton of Opher, in Galilee, was the birth-place of the prophet Jonah. Joshua makes this city to be part of the tribe of Zebulun; and St Jerom, in his preface upon Jonah, says, that it was two miles from Sephoris, otherwise called *Diocesarea*.

GATH-Rimmon, a city belonging to the tribe of Dan. St Jerom places it ten miles from Diospolis on the way from Eleutheropolis. It was given to the Levites of Kohath's family.

GATH-Rimmon, was also a city in the half-tribe of Manasseh, on this side Jordan, and was also given for a place of abode to the Levites of Kohath's family.

GATH-Rimmon, was likewise a city in the tribe of Ephraim, given to the Kohathites.

GATTON, a borough in the county of Surry, 19 miles from London. It lies under the side of a hill going to Reygate; and is supposed to have been known to the Romans by reason of their coins and other antiquities that have been found here. It is a borough by prescription; and has sent members to parliament ever since the 29th of Henry VI. It was formerly a large town; but is now a mean village, with a small church, and without either fair or market. The members are returned by its constable, who is annually chosen at the lord of the manor's court.

GAUBIUS (Hieronymus David), a celebrated physician of Holland. He studied under the illustrious Boerhaave; and became so much the favourite of his professor, that he resigned the chemical chair in his favour. He taught at Leyden with great applause for 40 years. In the year 1775 he laid down his office, as being no longer able to support the fatigues of it. He was succeeded by John David Hahn, then professor at Utrecht. His reputation was extended all over Europe by several valuable publications, particularly by his *Institutiones Pathologiae Medicinalis*, and his *Adversaria*, which have contributed not a little to the improvement both of the theory and practice of medicine. He died at Leyen 29th November 1780, in the 76th year of his age.

GAUDEN (Dr Joseph), son of John Gauden vicar of Mayfield in Essex, was born there in 1605. At the commencement of the civil war, he was chaplain to Robert earl of Warwick; who taking part with the parliament against the king, was followed by his chaplain. Upon the establishment of the Presbyterian model of church-government, he complied with the ruling powers, and was nominated one of the assembly of divines who met at Westminster in 1643, and took the covenant; yet having offered some scruples and objections to it, his name was afterwards struck out of the list. Nor did he espouse the parliament cause any longer than they adhered to their first avowed principles of reforming only, instead of destroying, mo-

narchy and episcopacy. In this spirit he was one of those divines who signed a protestation to the army, against the violent proceedings that affected the life of the king: and a few days after his execution published the famous ΕΙΚΩΝ ΒΑΣΙΛΙΚΗ, *A Portraiture of his Sacred Majesty in his Solitude and Sufferings*; which ran through 50 editions in the course of a year. Upon the return of Charles II. he was promoted to the see of Exeter; and in 1662 was removed to Worcester, much to his regret, having flattered himself with the hopes of a translation to Winchester; and his death happened the same year. He wrote many controversial pieces suited to the circumstances of the times, and to his own views from them. The *Eikon Basilike* above mentioned he published as the king's private meditations: though on this point there has been a long controversy. After the bishop's death, his widow, in a letter to one of her sons, calls it *The Jewel*; and said, her husband had hoped to make a fortune by it; and that she had a letter of a very great man's, which would clear up that he writ it. This assertion, as the earl of Clarendon had predicted, was eagerly espoused by the anti-royalists, in the view of disparaging Charles I. But it has been observed, that Gauden had too luxuriant an imagination, which betrayed him into a rankness of style in the Asiatic way; and from thence, as bishop Burnet argues with others, it may be certainly concluded, that not he, but the king himself, was the true author of the ΕΙΚΩΝ ΒΑΣΙΛΙΚΗ; in which there is a nobleness and justness of thought, with a greatness of style, that made it be looked on as the best written book in the English language.

GAVEL, or *GABEL*, among builders. See *GABEL*.

GAVEL, in law: tribute, toll, custom, or yearly revenue; of which we had in old time several kinds. See *GABEL*.

GAVEL-Kind, a tenure or custom belonging to lands in the county of Kent. The word is said by Lambard to be compounded of three Saxon words, *gyfe*, *eal*, *kyn*, "omnibus cognatione proximis data." Vertegan calls it *gavelkind*, quasi "give all kind," that is, to each child his part: and Taylor, in his history of *gavelkind*, derives it from the British *gavel*, i. e. a hold or tenure, and *cenned*, "generatio aut familia;" and so *gavel cenned* might signify *tenura generationis*.—It is universally known what struggles the Kentish men made to preserve their ancient liberties, and with how much success those struggles were attended. And as it is principally here that we meet with the custom of *gavelkind* (though it was and is to be found in some other parts of the kingdom), we may fairly conclude, that this was a part of these liberties; agreeably to Mr Selden's opinion, that *gavelkind*, before the Norman conquest, was the general custom of the realm. The distinguishing properties of this tenure are various: some of the principal are these. 1. The tenant is of age sufficient to alienate his estate by feoffment, at the age of 15. 2. The estate does not escheat in case of an attainer and execution for felony; their maxim being, "the father to the bough, the son to the plough." 3. In most places he had a power of devising lands by will, before the statute for that purpose was made. 4. The lands descend, not to the eldest, youngest, or any one son only, but to all the sons together; which was indeed anciently the most usual course of descent

Gauden,
Gavel.

Gavelet
II
Gauging.

all over Eng. and, though in particular places particular customs prevailed.

GAVELET, in law, an ancient and special cessavit used in Kent, where the custom of gavelkind continues, by which the tenant, if he withdraws his rent and services due to the lord, forfeits his land and tenements.

The process of the gavelet is thus. The lord is first to seek by the steward of his court, from three weeks to three weeks, to find some distress upon the tenement, till the fourth court; and if at that time he find none, at this fourth court it is awarded, that he take the tenement in his hand in name of a distress, and keep it a year and a day without manuring; within which time, if the tenant pay his arrears, and make reasonable amends for the withholding, he shall have and enjoy his tenement as before: if he come not before the year and day be past, the lord is to go to the next county-court, with witnesses of what had passed at his own court, and pronounce there his process, to have further witnesses; and then by the award of his own court, he shall enter and manure the tenement as his own: so, that if the tenant desired afterwards to have and hold it as before, he must agree with the lord; according to this old saying: "Has he not since any thing given, or any thing paid, then let him pay five pound for his were, e're he become heald again." Other copies have the first part with some variation; "Let him nine times pay, and nine times repay."

GAVELET, in London, is a writ used in the hustings, given to lords of rents in the city of London. Here the parties, tenant and demandant, appear by *seire facias*, to show cause why the one should not have his tenement again on payment of his rent, or the other recover the lands on default thereof.

GAUGAMELA, (anc. geog.), a village of Attica, lying between the rivers Lycus and Tigris; famous for Alexander's victory over Darius. It is said to have been allowed to Darius Hystaspis for the maintenance of a camel; and hence the name. It was not far from a more considerable place called *Arbela*; whence the latter gave the name to the victory. See **ARBELA**.

GAUGE-POINT of a solid measure, the diameter of a circle whose area is equal to the solid content of the same measure.

GAUGER, a king's officer, who is appointed to examine all tuns, pipes, hogsheds, and barrels, of wine, beer, ale, oil, honey, &c. and give them a mark of allowance, before they are sold in any place within the extent of his office.

GAUGING, See **GEOMETRY**.

GAUGING-Rod, an instrument used in gauging or measuring the contents of any vessel. That usually employed is the four-foot gauging-rod. It is commonly made of box, and consists of four rules, each a foot long and about three-eighths of an inch square, joined together by three brass joints; by which means the rod is rendered four feet long when the four rules are quite opened, and but one foot when they are all folded together. On the first face of this rod, marked 4, are placed two diagonal lines; one for beer and the other for wine: by means of which the content of any common vessel in beer or wine gallons may be readily found, by putting the rod in at the bung-hole of

N^c 135.

the vessel till it meets the intersection of the head of the vessel with the staves opposite to the bung-hole. For distinction of this line, there is written thereon, *beer* and *wine gallons*. On the second face, 5, are a line of inches and the gauge-line; which is a line expressing the areas of circles, whose diameters are the correspondent inches in ale-gallons. At the beginning is written, *ale area*. On the third face, 6, are three scales of lines; the first, at the end of which is written *hoghead*, is for finding how many gallons there are in a hoghead when it is not full, lying with its axis parallel to the horizon. The second line, at the end of which is written *B. L.* signifying a *butt lying*, is for the same use as that for the hoghead. The third line is to find how much liquor is wanting to fill up a butt when it is standing: at the end of it is written *B. S.* signifying a *butt standing*. In the half of the fourth face of the gauging-rod, 7, there are three scales of lines, to find the wants in a firkin, kilderkin, and barrel, lying with their areas parallel to the horizon. They are distinguished by letters *F. K. B.* signifying a *firkin*, *kilderkin*, and *barrel*.

Use of the diagonal lines on this rod. To find the content of a vessel in beer or wine gallons, put the braised end of the gauging-rod into the bung-hole of the cask, with the diagonal lines upwards, and thrust this braised end to the meeting of the head and staves; then with chalk make a mark at the middle of the bung-hole of the vessel, and also on the diagonal lines of the rod, right against, over one another, when the braised end is thrust home to the head and staves: then turn the gauging-rod to the other end of the vessel, and thrust the braised end home to the end, as before. Lastly, see if the mark made on the gauging-rod come even with the mark made on the bung-hole when the rod was thrust to the other end; which if it be, the mark made on the diagonal lines will, on the same lines, show the whole content of the cask in beer or wine gallons.

If the mark made on the bung-hole be not right against that made on the rod when you put it the other way, then right against the mark made on the bung-hole make another on the diagonal lines; and the division on the diagonal line between the two chalks will show the vessel's whole contents in beer or wine gallons. Thus, *e. gr.* if the diagonal line of a vessel be 28 inches four-tenths, its contents in beer gallons will be near 51, and in wine gallons 62.

If a vessel be open, as a half-barrel, tun, or copper, and the measure from the middle on one side to the head and staves be 38 inches, the diagonal line gives 122 beer-gallons; half of which, *viz.* 61, is the content of the open half tub.

If you have a large vessel, as a tun or copper, and the diagonal line taken by a long rule proves 70 inches; the content of that vessel may be found thus: Every inch at the beginning-end of the diagonal-line call ten inches. Thus ten inches becomes 100 inches; and every tenth of a gallon call 100 gallons; and every whole gallon call 1000 gallons.

Example. At 44.8 inches on the diagonal beer-line is 200 gallons; so that 4 inches 48 parts, now called 44 inches 8-tenths, is just two-tenths of a gallon, now called 200 gallons: so also if the diagonal line be 76 inches and 7-tenths, a close cask of such diagonal will

Plate
CCV.

Gaul.

will hold 1000 beer-gallons; but an open cask but half so much, viz. 500 beer-gallons.

Use of the GAUGE-LINE. To find the content of any cylindrical vessel in ale-gallons: seek the diameter of the vessel in inches, and just against it on the gauge-line is the quantity of ale-gallons contained in one inch deep: this multiplied by the length of the cylinder will give its content in ale-gallons.

For example, suppose the length of the vessel 32.06, and the diameter of its base 25 inches; to find what is the content in ale-gallons? Right against 25 inches on the gauge-line is one gallon and $\frac{745}{1000}$ of a gallon; which multiplied by 32.06, the length, gives 55.9447 gallons for the content of the vessel.

The bung diameter of a hoghead being 25 inches, the head diameter 22 inches, and the length 32.06 inches; to find the quantity of ale-gallons contained in it?—Seek 25, the bung diameter, on the line of inches; and right against it on the gauge-line you will find 1.745: take one-third of it, which is .580, and set it down twice: seek 22 inches in the head diameter, and against it you will find on the gauge-line 1.356; one-third of which added to twice .580, gives 1.6096; which multiplied by the length 32.06, the product will be 51.603776, the content in ale-gallons. Note, this operation supposes, that the aforesaid hoghead is in the figure of the middle frustum of a spheroid.

The use of the lines on the two other faces of the rod is very easy; you need only put it downright into the bung-hole (if the vessel you desire to know the quantity of ale-gallons contained therein be lying) to the opposite staves; and then where the surface of the liquor cuts any one of the lines appropriated to that vessel, will be the number of gallons contained in that vessel.

GAUL, the name given by the Romans to the country that now forms the kingdom of France.—The original inhabitants were descended from the Celtes or Gomerians, by whom the greatest part of Europe was peopled; the name of *Galli* or *Gauls*, being probably given them long after their settlement in that country. See GALLIA.

The ancient history of the Gauls is entirely wrapped up in obscurity and darkness; all we know concerning them for a long time is, that they multiplied so fast, that, their country being unable to contain them, they poured forth in vast multitudes into other countries, which they generally subdued, and settled themselves in. It often happened, however, that these colonies were so molested by their neighbours, that they were obliged to send for assistance to their native country. This was always very easily obtained. The Gauls were, upon every occasion, ready to send forth great numbers of new adventurers; and as these spread desolation wherever they came, the very name of *Gauls* proved terrible to most of the neighbouring nations.—The earliest excursion of these people, of which we have any distinct account, was into Italy, under a famed leader, named *Bellovesus*, about 622 years before Christ. He crossed the Rhone and the Alps, till then unattempted; defeated the *Hetrurians*; and seized upon that part of their country, since known by the names of *Lombardy* and *Piedmont*.—The second grand expedition was made by the *Cœnomani*, a people dwelling between the rivers *Seine* and *Loire*, under a general named *Elitonis*. They settled in those parts of Italy now known by the names of *Bresciano*, *Cremo-*

nese, *Mantuan*, *Carniola*, and *Venetian*.—In a third excursion, two other Gaulish nations settled on both sides of the river *Po*; and in a fourth, the *Boii* and *Lingones* settled in the country between *Ravenna* and *Bologna*. The time of these three last expeditions is uncertain.

The fifth expedition of the Gauls was more remarkable than any of the former, and happened about 200 years after that of *Bellovesus*. The *Senones*, settled between *Paris* and *Meux*, were invited into Italy by an *Hetrurian* lord, and settled themselves in *Umbria*. *Brennus* their king laid siege to *Clusium*, a city in alliance with *Rome*; and this produced a war with the *Romans*, in which the latter were at first defeated, and their city taken and burnt; but at length the whole army was cut off by *Camillus*, inasmuch that not a single person escaped.

Some other expeditions the Gauls undertook against the *Romans*: in which, though they always proved unsuccessful, by reason of their want of military discipline; yet their fierceness and courage made them so formidable to the republic, that, on the first news of their march, extraordinary levies of troops were made, sacrifices and public supplications offered to the gods, and the law which granted an immunity from military service to priests and old men, was, for the time, abolished.

Against the *Greeks*, the expeditions of the Gauls were very little more successful than against the *Romans*. The first of these we hear of was about 279 years before Christ, in the year after *Pyrrius* had invaded Italy. At this time, the Gauls finding themselves greatly overstocked at home, sent out three great colonies to conquer new countries for themselves. One of these armies was commanded by *Brennus*, another by *Cerethrius*, and the third by *Belgius*. The first entered *Pannonia* or *Hungary*; the second *Thrace*; and the third marched into *Illyricum* and *Macedonia*. Here *Belgius* at first met with great success; and enriched himself by plunder to such a degree, that *Brennus* envying him, resolved to enter the same countries, in order to share the spoil. In a short time, however, *Belgius* met with such a total defeat, that his army was almost entirely destroyed; upon which *Brennus* hastened to the same place. His army at first consisted of 150,000 foot and 15,000 horse: but two of his principal officers revolted, and carried off 20,000 men, with whom they marched into *Thrace*; where, having joined *Cerethrius*, they seized on *Byzantium* and the western coast of *Propontis*, making the adjacent parts tributary to them.—To retrieve this loss, *Brennus* sent for fresh supplies from *Gaul*; and having increased his army to 130,000 foot, and upwards of 60,000 horse, he entered *Macedonia*, defeated the general who opposed him, and ravaged the whole country. He next marched towards the straits of *Thermopylæ*, with a design to invade *Greece*; but was stopped by the forces sent to defend that pass against him. He passed the mountains, however, as *Xerxes* had formerly done; upon which the guards retired, to avoid being surrounded. *Brennus* then, having ordered *Acichorius*, the next to him in command, to follow at a distance with part of his army, marched with the bulk of the forces to *Delphi*, in order to plunder the rich temple there. This enterprise proved exceedingly unfortunate: a great number of his men were destroyed

Gaul.

2
Expedition
against the
Greeks.

1
count of
Gaulish
ursions
Italy.

Gaul.
3
Miserable
fare of their
army.

by a dreadful storm of hail, thunder, and lightning; another part of his army was destroyed by an earthquake; and the remainder, some how or other, imagining themselves attacked by the enemy, fought against each other the whole night, so that in the morning scarce one half of them remained. The Greek forces then poured in upon them from all parts; and that in such numbers, that though Acichorius came up in due time with his forces, Brennus found himself unable to make head against the Greeks, and was defeated with great slaughter. He himself was desperately wounded; and so disheartened by his misfortune, that, having assembled all his chiefs, he advised them to kill all the wounded and disabled, and to make the best retreat they could; after which he put an end to his own life. On this occasion, it is said that 20,000 of these unhappy people were executed by their own countrymen. Acichorius then set out with the remainder for Gaul; but by being obliged to march through the country of their enemies, the calamities they met with by the way were so grievous, that not one of them reached their own country. A just judgement, say the Greek and Roman authors, for their sacrilegious intentions against Delphi.

4
Gaul invaded by
the Romans.

The Romans having often felt the effects of the Gaulish ferocity and courage, thought proper at last, in order to humble them, to invade their country. Their first successful attempt was about 118 years before Christ, under the command of Quintus Marcius, surnamed *Rex*. He opened a way betwixt the Alps and the Pyrenees, which laid the foundation for conquering the whole country. This was a work of immense labour of itself, and rendered still more difficult by the opposition of the Gauls, especially those called the Stæni, who lived at the foot of the Alps. These people finding themselves overpowered by the consular army, set fire to their houses, killed their wives and children, and then threw themselves into the flames. After this Marcius built the city of Narbonne, which became the capital of a province. His successor Scaurus also conquered some Gaulish nations; and in order to facilitate the sending troops from Italy into that country, he made several excellent roads between them, which before were almost impassable. These successes gave rise to the invasion of the Cimbri and Teutones; an account of whose unfortunate expedition is given under the articles CIMBRI, ROME, TEUTONES, &c.

5
Surprising
success of
Julius Cæsar.

From this time, the Gauls ceased to be formidable to the Romans, and even seem to have been for some time on good terms with them. At last, however, the Helvetii kindled a war with the republic, which brought Cæsar over the Alps, and ended in the total subjection of the country. Orgetorix was the first cause of it; who had engaged a vast number of his countrymen to burn their towns and villages, and to go in search of new conquests. Julius Cæsar, to whose lot the whole country of Gaul had fallen, made such haste to come and suppress them, that he was got to the Rhone in eight days; broke down the bridge of Geneva, and, in a few days more, finished the famed wall between that city and mount Jura, now St Claude, which extended seventeen miles in length, was sixteen feet high, fortified with towers and castles at proper distances, and a ditch that ran the whole length of it. If his own account of it may be relied upon, he

did not set out till the beginning of April; and yet this huge work was finished by the ides or 13th of the month: so that, subtracting the eight days he was coming, it must have been all done in about five days: a prodigious work, considering he had but one legion there, or even though the whole country had given him assistance. Whilst this was doing, and the reinforcements he wanted were coming, he amused the Helvetii, who had sent to demand a passage through the country of the Allobroges, till he had got his reinforcements; and then flatly refused it to them: whereupon a dreadful battle ensued; in which they lost one hundred and thirty thousand men, in spite of all their valour; besides a number of prisoners, among whom was the wife and daughter of Orgetorix, the leader of this unfortunate expedition. The rest submitted, and begged they might be permitted to go and settle among the Ædui, from whom they originally sprung; and, at the request of these last, were permitted to go.

The Gauls were constantly in a state of variance with one another; and Cæsar, who knew how to make the most of these intestine broils, soon became the protector of the oppressed, a terror to the oppressor, and the umpire of all their contentions. Among those who applied to him for help, were his allies the Ædui; against whom Ariovistus, king of the Germans, joined with the Averni, who inhabited the banks of the Loire, had taken the country of the Sequani from them, and obliged them to send hostages to him. Cæsar forthwith sent to demand the restitution of both, and, in an interview which he soon after obtained of that haughty and treacherous prince, was like to have fallen a sacrifice to his perfidy; upon which he bent his whole power against him, forced him out of his strong intrenchments, and gave him a total overthrow. Ariovistus escaped, with difficulty, over the Rhine; but his two wives, and a daughter, with a great number of Germans of distinction, fell into the conqueror's hand. Cæsar, after this signal victory, put his army into winter-quarters, whilst he went over the Alps to make the necessary preparations for the next campaign. By this

time all the Belgæ in general were so terrified at his success, that they entered into a confederacy against the Romans as their common enemy. Of this, Labienus, who had been left in Gaul, sent Cæsar notice; upon which he immediately left Rome, and made such dispatch, that he arrived upon their confines in about fifteen days. On his arrival, the Rhemi submitted to him; but the rest, appointing Galba, king of the Sueffones, general of all their forces, which amounted to one hundred and fifty thousand men, marched directly against him. Cæsar, who had seized on the bridge of the Axona, now Aisne, led his light horse and infantry over it; and whilst the others were encumbered in crossing that river, made such a terrible slaughter of them, that the river was filled with their dead, inasmuch that their bodies served for a bridge to those who escaped. This new victory struck such terror into the rest, that they dispersed themselves; immediately after which, the Sueffones, Bellovaci, Ambiones, and some others, submitted to him. The Nervii, indeed, joined with the Atrebatæ and Veromandui against them; and having first secured their wives and children, made a vigorous resistance for some time;

but:

Gaul.

6
A general
confederacy
against
him.

7
The Gauls
defeated
with great
slaughter.

⁸ Gaul. but were at length defeated, and the greatest part of them slain. The rest, with their wives and old men, surrendered themselves, and were allowed to live in their own cities and towns as formerly. The Aduatici were next subdued; and, for their treachery to the conqueror, were sold for slaves, to the number of fifty thousand. Young Crassus, the son of the triumvir, subdued likewise seven other nations, and took possession of their cities; which not only completed the conquest of the Belgæ, but brought several nations from beyond the Rhine to submit to the conqueror. The Veneti, or ancient inhabitants of Vannes in Brittany, who had been likewise obliged to send hostages to the conqueror, were, in the mean time, making great preparations by sea and land to recover their liberty. Cæsar, then in Illyricum, was forced to equip a fleet on the Loire; and having given the command of it to Brutus, went and defeated them by land, as Brutus did by sea; and having put their chief men to death, sold the rest for slaves. The Unelli, with Veridorix their chief, together with the Lexovii and Aulercii, were about the same time subdued by Sabinus, and the Aquitani by Crassus, with the loss of thirty thousand men. There remained nothing but the countries of the Morini and Menapii to be conquered of all Gaul. Cæsar marched himself against them: but he found them so well intrenched in their inaccessible fortresses, that he contented himself with burning and ravaging their country; and having put his troops into winter-quarters, again passed over the Alps, to have a more watchful eye on some of his rivals there. He was, however, soon after obliged to come to defend his Gaulish conquests against some nations of the Germans, who were coming to settle there, to the number of four hundred thousand. These he totally defeated, and then resolved to carry his conquering arms into Germany: but for an account of his exploits there, see the article GERMANY.

the Gauls
vult, but
sub-
ed.
Upon his return into Gaul, he found it labouring under a great famine, which had caused a kind of universal revolt. Cotta and Sabinus, who were left in the country of the Eburones, now Liege, were betrayed into an ambush by Ambiorix, one of the Gaulish chiefs, and had most of their men cut off. The Aduatici had fallen upon Q. Cicero, who was left there with one legion, and had reduced him to great straits: at the same time Labienus, with his legion, was attacked by Indutiomarus, at the head of the Rheni and Senones; but had better luck than the rest, and, by one bold sally upon them, put them to flight, and killed their general. Cæsar acquired no small credit by quelling all these revolts; but each victory lost the lives of so many of his troops, that he was forced to have recourse to Pompey for a fresh supply, who readily granted him two of his own legions to secure his Gaulish conquests.

⁹ second
vult.
But it was not long before the Gauls, ever restless under a foreign yoke, raised up a new revolt, and obliged him to return thither. His fear left Pompey should gain the affections of the Roman people, had obliged him to strip the Gauls of their gold and silver, to bribe them over to his interest; and this gave no small handle to those frequent revolts which happened during his absence. He quickly, however, reduced the Nervii, Aduatici, Menapii, and Treviri; the last of whom had raised the revolt, under the command of Ambiorix: but he found the flame spread much

farther, even to the greatest part of the Gauls, who had chosen Vercingetorix their generalissimo. Cæsar was forced to leave Insurbria, whither he had retired to watch the motions of Pompey, and, in the midst of winter and snow, to repass the Alps into the province of Narbonne. Here he gathered his scattered troops with all possible speed; and, in spite of the hard weather, besieged and took Noviodunum, now Noyons; and defeated Vercingetorix, who was come to the relief of that place. He next took the city of Avaricum, now Bourges, one of the strongest in Gaul, and which had a garrison of forty thousand men; of whom he made such a dreadful slaughter, that hardly eight hundred escaped. Whilst he was besieging Gergovia, the capital of the Arverni, he was informed that the Nitiobriges, or Agenois, were in arms; and that the Ædui were sending to Vercingetorix ten thousand men, which they were to have sent to reinforce Cæsar. Upon this news, he left Fabius to carry on the siege, and marched against the Ædui. These, upon his approach, submitted, in appearance, and were pardoned; but soon after that whole nation rose up in arms, and murdered all the Italian troops in their capital. Cæsar, at this, was in great straits what measures to take; but resolved at length to raise the siege of Gergovia, and at once attack the enemy's camp, which he did with some success; but when he thought to have gone to Noviodunum, or Noyons, where his baggage, military chest, &c. were left, he heard that the Ædui had carried it off, and burnt the place. Labienus, justly thinking that Cæsar would want his assistance in the condition he now was, went to join him, and in his way defeated a Gaulish general named *Camulogeno*, who came to oppose his march: but this did not hinder the revolt from spreading itself all over Celtic Gaul, whither Vercingetorix had sent for fresh supplies, and, in the mean time, attacked Cæsar; but was defeated, and forced to retire to Alesia, a strong place, now Alesia in Burgundy, as is supposed. Hither Cæsar hastened, and besieged him; and, having drawn a double circumvallation, with a design to starve him in it, as he was likely to have done, upon that account refused all offers of a surrender from him. At length, the long-expected reinforcement came, consisting of 160,000 men, under four generals: these made several fruitless attacks on Cæsar's trenches; but were defeated in three several battles, which at length obliged Vercingetorix to surrender at discretion. Cæsar used all his prisoners with great severity, except the Ædui and Arverni, by whose means he hoped to gain their nations, which were the most potent of Celtic Gaul: nor was he disappointed; for both of them submitted to him, and the former received him into the capital, where he spent the winter, after he put his army into winter-quarters. This campaign, as it proved one of the hardest he ever had, so he gained more glory by it than any Roman general had done before: yet could not at all by this procure from the servile senate, now wholly dedicated to his rival, a prolongation of his proconsulship; upon which he is reported to have laid his hand upon his sword, and said, that that should do it.

He was as good as his word; and the Gauls, upon their former ill success, resolving to have as many separate armies as provinces, in order to embarrass him

Gaul.

the more, Cæsar, and his generals Labienus and Fabius, were forced to fight them one after another; which they did, however, with such success, that, notwithstanding the hardness of the season, they subdued the Bituriges, Carnuti, Rhemi, and Bellovaci, with their general Correus, by which he at once quieted all the Belgic provinces bordering on Celtic Gaul. The next who followed were the Treviri, the Eburones, and the Andes, under their general Dunmarus. The last place which held out against him was Uxellodunum; which was defended by the two last acting generals of the Gauls. Drapes, the Senonian, and Luterius the Cadurcean. The place being strong, and well garrisoned, Cæsar was obliged to march thither, from the farthest part of Belgic Gaul; and soon after reduced it, for want of water. Here again he caused the right-hands of all that were fit to bear arms to be cut off, to deter the rest from revolting afresh. Thus was the conquest of Gaul finished from the Alps and Pyrenees to the Rhine, all which vast tract was now reduced to a Roman province under the government of a prætor. During his several expeditions into Gaul, Cæsar is said to have taken 800 cities; to have subdued 300 different nations; and to have defeated, in several battles, three millions of men, of whom one million were killed, and another taken prisoners.—The history of the country, from the time of its conquest by the Romans to the present, is given under the articles *ROME* and *FRANCE*.

17-
Gaul reduced to a Roman province.

12
Character, &c. of the ancient Gauls.

The Gauls anciently were divided into a great number of different nations, which were continually at war with one another, and at variance among themselves. Cæsar tells us, that not only all their cities, cantons, and districts, but even almost all families, were divided and torn by factions; and thus undoubtedly facilitated the conquest of the whole. The general character of all these people was an excessive ferocity and love of liberty. This last they carried to such an extreme, that either on the appearance of servitude, or incapacity of action through old age, wounds, or chronic diseases, they put an end to their own lives, or prevailed upon their friends to kill them. In cities, when they found themselves so straitly besieged that they could hold out no longer, instead of thinking how to obtain honourable terms of capitulation, their chief care very often was to put their wives and children to death, and then to kill one another, to avoid being led into slavery. Their excessive love of liberty and contempt of death, according to Strabo, very much facilitated their conquest by Cæsar; for pouring their numerous forces upon such an experienced enemy as Cæsar, their want of conduct very soon proved the ruin of the whole.

The chief diversion of the Gauls was hunting; and indeed, considering the vast forests with which their country abounded, and the multitude of wild beasts which lodged in them, they were under an absolute necessity to hunt and destroy them, to prevent the country from being rendered totally uninhabitable. Besides this, however, they had also their hippodromes, horse and chariot races, tilts and tournaments; at all of which the bards assisted with their poems, songs, and musical instruments.—For an account of their religion, see the article *DRUID*.

The Gauls were excessively fond of feasting, in

which they were very profuse; as, like all other northern nations, they were great lovers of good eating and drinking. Their chief liquors were beer and wine. Their tables were very low. They eat but little bread, which was baked flat and hard, and easily broken in pieces: but devoured a great deal of flesh, boiled, roasted, or broiled; and this they did in a very slovenly manner, holding the piece in their hands, and tearing it with their teeth. What they could not part by this way, they cut with a little knife which hung at their girdle. When the company was numerous, the *Coryphæe*, or chief of the feast, who was either one of the richest, or noblest, or bravest, sat in the middle, with the master of the house by his side; the rest took their places next according to their rank, having their servants holding their shields behind them. These feasts seldom ended without bloodshed; but if by chance the feast proved a peaceable one, it was generally accompanied not only with music and songs, but likewise with dances, in which the dancers were armed cap-a-pee, and beat time with their swords upon their shields. On certain festivals they were wont to dress themselves in the skins of beasts, and in that attire accompany the processions in honour of their deities or heroes. Others dressed themselves in masquerade habits, some of them very indecent, and played several antic and immodest tricks. This last custom continued long after their conversion to Christianity.

Gaulanitis
Gauntlope.

GAULANITIS, or **GAULONITIS**, (Josephus); (anc. geog.) according to the different manner of writing the capital, *Golan* or *Gaulon*; the extreme part of Bashan to the south, and bordering on the tribe of Gad. It was divided into the Superior, which to the east extended to Arabia; and into the Inferior, which lay on the lake of Genesareth, (Josephus).

GAULON, or **GOLAN**, the capital of the Gaulanitis Superior; a Levitical city and place of refuge, (Moses, Joshua).

GAULOS, (anc. geog.) a small island of Sicily, in the African sea, adjoining to Melite or Malta; with commodious harbours; a colony of Phœnicians, with a cognominal town. Gaulonitæ, the people, (Inscription). Now called *Gozo*, five miles to the west of Malta.

GAULTHERIA, in botany: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 18th order, *Bicornes*. The exterior calyx is diphyllous, the interior quinquefid; the corolla ovate; the nectarium consists of ten subulated points. The capsule is quinquelocular, covered with the interior calyx, formed in the shape of a berry.

GAUNT-BELLIED, in the manege, is said of a horse whose belly shrinks up towards his flanks.

GAUNTLET. See *GANTLET*.

GAUNTLOPE, pronounced *Gauntlet*, a military punishment for felony, or some other heinous offence.

In vessels of war, it is executed in the following manner. The whole ship's crew is disposed in two rows, standing face to face on both sides of the deck, so as to form a line whereby to go forward on one side, and return *ast* on the other; each person being furnished with a small twisted cord, called a *knittle*, having two or three knots upon it. The delinquent is then stripped naked above the waist, and ordered to pass forward between

Gavies or **Gause**. between the two rows of men, and aft on the other side, a certain number of times, rarely exceeding three; during which every person gives him a stripe as he runs along. In his passage through this painful ordeal, he is sometimes tripped up, and very severely handled while incapable of proceeding. This punishment, which is called *running the gauntlet*, is seldom inflicted, except for such crimes as will naturally excite a general antipathy among the sea-men; as, on some occasions, the culprit would pass without receiving a single blow, particularly in cases of mutiny and sedition, to the punishment of which our sailors seem to have a constitutional aversion.

In the *land-service*, when a soldier is sentenced to run the gauntlet, the regiment is drawn out in two ranks facing each other; each soldier, having a switch in his hand, lashes the criminal as he runs along naked from the waist upwards. While he runs, the drums beat at each end of the ranks. Sometimes he runs three, five, or seven times, according to the nature of the offence. The major is on horseback, and takes care that each soldier does his duty.

GAVIES, or **GAURS**. See **GABRES**.

GAVOTTA, or **GAVOTTE**, is a kind of dance, the air of which has two brisk and lively strains in common time, each of which strains is twice played over. The first has usually four or eight bars; and the second contains eight, twelve, or more. The first begins with a minim, or two crotchets, or notes of equal value, and the hand rising; and ends with the fall of the hand upon the dominant or mediant of the mode, but never upon the final, unless it be a rondeau: and the last begins with the rise of the hand, and ends with the fall upon the final of the mode.

Tempi di GAVOTTA, is when only the time or movement of a gavotte is imitated, without any regard to the measure or number of bars or strains.—Little airs are often found in sonatas, which have this phrase to regulate their motions.

GAURA, in botany: A genus of the monogynia order, belonging to the octandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quadrid and tubular; the corolla pentapetalous, with the petals rising upwards. The nut is inferior, monospermous, and quadrangular.

GAUSE, or **GAWSE**, in commerce, a very thin, slight, transparent kind of stuff, woven sometimes of silk, and sometimes only of thread.—To warp the silk for making of gause, they use a peculiar kind of mill, upon which the silk is wound: this mill is a wooden machine about six feet high, having an axis perpendicularly placed in the middle thereof, with six large wings, on which the silk is wound from off the bobbins by the axis turning round. When all the silk is on the mill, they use another instrument to wind it off again on two beams: this done, the silk is passed through as many little beads as there are threads of silk; and thus rolled on another beam to supply the loom.

The gause-loom is much like that of the common weavers, though it has several appendages peculiar thereto. See **LOOM**.

There are figured gausers; some with flowers of gold

and silver, on a silk ground: these last are chiefly brought from China.

GAY (John), a celebrated English poet, descended from an ancient family in Devonshire, was born at Exeter, and received his education at the free school of Barnstaple in that county, under the care of Mr William Rayner.—He was bred a mercer in the Strand; but having a small fortune, independent of business, and considering the attendance on a shop as a degradation of those talents which he found himself possessed of, he quitted that occupation, and applied himself to other views, and to the indulgence of his inclination for the muses. In 1712 we find him secretary, or rather domestic steward, to the duchess of Monmouth, in which station he continued till the beginning of the year 1714; at which time he accompanied the earl of Clarendon to Hanover, whither that nobleman was dispatched by Queen Anne. In the latter end of the same year, in consequence of the queen's death, he returned to England, where he lived in the highest estimation and intimacy of friendship with many persons of the first distinction both in rank and abilities.—He was even particularly taken notice of by Queen Caroline, then princess of Wales, to whom he had the honour of reading in manuscript his tragedy of the *Captives*; and in 1726 dedicated his *Fables*, by permission, to the duke of Cumberland.—From this countenance shown to him, and numberless promises made him of preferment, it was reasonable to suppose, that he would have been genteelly provided for in some office suitable to his inclination and abilities. Instead of which, in 1727, he was offered the place of gentleman-usher to one of the youngest princesses; an office which, as he looked on it as rather an indignity to a man whose talents might have been so much better employed, he thought proper to refuse; and some pretty warm remonstrances were made on the occasion by his sincere friends and zealous patrons the duke and duchess of Queensberry, which terminated in those two noble personages withdrawing from court in disgust. Mr Gay's dependencies on the promises of the great, and the disappointments he met with, he has figuratively described in his fable of the *Hare with many friends*. However, the very extraordinary success he met with from public encouragement made an ample amends, both with respect to satisfaction and emolument, for those private disappointments.—For, in the season of 1727-8, appeared his *Beggars Opera*; the vast success of which was not only unprecedented, but almost incredible.—It had an uninterrupted run in London of 63 nights in the first season, and was renewed in the ensuing one with equal approbation. It spread into all the great towns of England; was played in many places to the 30th and 40th time, and at Bath and Bristol 50; made its progress into Wales, Scotland, and Ireland, in which last place it was acted for 24 successive nights; and last of all it was performed at Minorca. Nor was the fame of it confined to the reading and representation alone, for the card-table and drawing-room shared with the theatre and closet in this respect; the ladies carried about the favourite songs of it engraven upon their fan-mounts, and screens and other pieces of furniture, were decorated with the same. In short, the satire of this piece was so striking,

Gay,
Gaza.

king, so apparent, and so perfectly adapted to the taste of all degrees of people, that it overthrew the Italian opera, that Dagon of the nobility and gentry, which had so long seduced them to idolatry, and which Dennis, by the labours and outcries of a whole life, and many other writers by the force of reason and reflection, had in vain endeavoured to drive from the throne of public taste. The profits of this piece was so very great, both to the author and Mr Rich the manager, that it gave rise to a quibble, which became frequent in the mouths of many, viz. *That it had made Rich gay, and Gay rich*; and it has been asserted, that the author's own advantages from it were not less than 2000 l. In consequence of this success, Mr Gay was induced to write a second part to it, which he intitled *Polly*. But the disgust subsisting between him and the court, together with the misrepresentations made of him as having been the author of some disaffected libels and seditious pamphlets, occasioned a prohibition and suppression of it to be sent from the lord chamberlain, at the very time when every thing was in readiness for the rehearsal of it. A very considerable sum, however, accrued to him from the publication of it afterwards in quarto.—Mr Gay wrote several other pieces in the dramatic way, and many very valuable ones in verse. Among the latter, his *Trivia*, or the *Art of walking the streets of London*, tho' his first poetical attempt, is far from being the least considerable, and is what recommended him to the esteem and friendship of Mr Pope: but as, among his dramatic works, his *Beggar's Opera* did at first, and perhaps ever will, stand as an unrivalled master-piece, so, among his poetical works, his *Fables* hold the same rank of estimation, the latter having been almost as universally read as the former was represented, and both equally admired. Mr Gay's disposition was sweet and affable, his temper generous, and his conversation agreeable and entertaining. But he had one foible, too frequently incident to men of great literary abilities, and which subjected him at times to inconveniences which otherwise he needed not to have experienced, viz. an excess of indolence, without any knowledge of economy. So that, though his emoluments were, at some periods of his life, very considerable, he was at others greatly straitened in his circumstances; nor could he prevail on himself to follow the advice of his friend Dean Swift, whom we find in many of his letters endeavouring to persuade him to the purchasing of an annuity, as a reserve for the exigencies that might attend on old age.—Mr Gay chose rather to throw himself on patronage, than secure to himself an independent competency by the means pointed out to him; so that, after having undergone many vicissitudes of fortune, and being for some time chiefly supported by the liberality of the duke and duchess of Queensberry, he died at their house in Burlington-gardens, in December 1732. He was interred in Westminster-abbey, and a monument erected to his memory, at the expence of his aforementioned noble benefactors, with an inscription expressive of their regards and his own deserts, and an epitaph in verse by Mr Pope.

GAZA (Theodore), a famous Greek in the 15th century, was born in 1398. His country being invaded by the Turks, he retired into Italy; where he

at first supported himself by transcribing ancient authors, an employment the learned had frequent recourse to before the invention of printing. His uncommon parts and learning soon recommended him to public notice; and particularly to cardinal Bessarion, who procured him a benefice in Calabria. He was one of those to whom the revival of polite literature in Italy was principally owing. He translated from the Greek into Latin, Aristotle's History of Animals, Theophrastus on Plants, and Hippocrates's Aphorisms; and put into Greek, Scipio's Dream, and Cicero's Treatise on Old Age. He wrote several other works in Greek and Latin; and died at Rome in 1475.

GAZA, (anc. geog.), a principal city and one of the five satrapies of the Philistines. It was situated about 100 stadia from the Mediterranean, on an artificial mount, and strongly walled round. It was destroyed by Alexander the Great, and afterwards by Antiochus. In the time of the Maccabees it was a strong and flourishing city; but was destroyed a third time by Alexander Jannæus. At present it has a miserable appearance. The buildings are mean, both as to the form and matter. Some remains of its ancient grandeur appear in the handsome pillars of Parian marble which support some of the roofs; while others are disposed of here and there, in different parts of almost every beggarly cottage. On the top of the hill, at the north-east corner of the town, are the ruins of large arches sunk low into the earth, and other foundations of a stately building, from whence some of the bashaws have carried off marble pillars of an incredible size. The castle is a contemptible structure, and the port is ruined. E. Long. 34. 55. N. Lat. 31. 28.

GAZE-HOUND, or *Gast-hound*, one that makes more use of his sight than of his nose. Such dogs are much used in the north of England: they are fitter in an open champaign country than in bushy and woody places. If at any time a well-taught gaze-hound takes a wrong way, he will return upon a signal and begin the chase afresh. He is also excellent at spying out the fattest of a herd; and having separated it from the rest, will never give over the pursuit till he has worried it to death.

GAZEL, in zoology, a species of CAPRA.

GAZETTE, a newspaper, or printed account of the transactions of all the countries in the known world, in a loose sheet or half-sheet. This name is with us confined to that paper of news published by authority. The word is derived from *gazetta*, a Venetian coin, which was the usual price of the first newspaper printed there, and which was afterwards given to the paper itself.

The first gazette in England was published at Oxford, the court being there, in a folio half-sheet, Nov. 7. 1665. On the removal of the court to London, the title was changed to the *London Gazette*. The Oxford gazette was published on Tuesdays, the London on Saturdays: and these have continued to be the days of publication ever since.

GAZNA, a city of Asia, once much celebrated, and the capital of a very extensive empire; but which is now either entirely ruined, or become of so little consideration, that it is not taken notice of in our

Gaza
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Gazna.

Gazna. books of geography.—This city was anciently an emporium and fortress of Sablestan, not far from the confines of India. During the vast and rapid conquests of the Arabs, all this country had been reduced under their subjection. On the decline of the power of the khalifs, however, the vast empire established by Mahomet and his successors was divided into a number of independent principalities, most of which were but of short duration. In the year of the Hegira 384, answering to the 994th of the Christian era, the city of Gazna, with some part of the adjacent country, was governed by Mahmud Gazni; who became a great conqueror, and reduced under his subjection a considerable part of India, and most of Persia.

This empire continued in the family of Mahmud Gazni for upwards of 200 years. None of his successors, however, were possessed of his abilities; and therefore the extent of the empire, instead of increasing, was very considerably diminished soon after Mahmud's death. The Seljuks made themselves masters of Khorasan, and could not be driven out; the greatest part of the Persian dominions also fell off; and in the 547th year of the Hegira, the race of Gazni sultans were entirely set aside by one Gauri, who conquered Khosru Shah the reigning prince, and bestowed his dominions on his own nephew Gayathoddin Mohammed. These new sultans proved greater conquerors than the former, and extended their dominions farther than even Mahmud Gazni himself had done. They did not, however, long enjoy the sovereignty of Gazna; for in 1218, Jenghiz Khan having conquered the greatest part of China and almost all Tartary, began to turn his arms westward; and set out against the sultan of Gazna at the head of 700,000 men.

To oppose this formidable army, Mohammed, the reigning sultan, could muster only 400,000 men; and, in the first battle, 160,000 of his troops are said to have perished. After this victory, Jenghiz Khan advanced; Mohammed not daring to risk a second battle, the loss of which would have been attended with the entire ruin of his kingdom. He therefore distributed his army among the strongest fortified towns he had in his dominions; all of which Jenghiz Khan took one after another. The rapid progress of his conquests, indeed, almost exceeds belief. In 1219 and 1220, he had reduced Zarnuk, Nur, Bokhara, Otrar, Saganak, Uzkant, Alshash, Jund, Tonkat, Khojend; and Samarcand.—Mohammed, in the mean time, fled first to Bokhara; but on the approach of Jenghiz Khan's army, quitted that place, and fled to Samarcand. When this last city was also in danger of being invested, the sultan did not think proper to trust himself in it more than in the other, though it was garrisoned by 100,000 of his bravest troops; and therefore fled through by-ways into the province of Ghilan in Persia, where he took refuge in a strong fortress called *Estabad*. But being also found out in this retreat, he fled to an island in the Caspian sea called *Abiskun*; where he ended his days, leaving his empire, such as it was, to his son Jaloloddin.

The new sultan was a man of great bravery and experience in war; but nothing was able to stop the progress of the Moguls. In 1220 and 1221, they made themselves masters of all the kingdoms of Karazim and Khorasan, committing every where such massacres as

were never heard of before or since that time. In the mean time Jaloloddin assembled his forces with the utmost diligence, and defeated two detachments of the Mogul army. This happened while Jenghiz Khan was besieging Bamiyan; but answered little other purpose, than serving to bring upon that city the terrible destruction, of which an account is given under the article *BAMIYAN*. Immediately after the reduction of that city, Jenghiz Khan marched towards Gazna; which was very strongly fortified, and where he expected to have found Jaloloddin. But he had left the place 15 days before; and, as Jenghiz Khan's army was much reduced, he might perhaps have stood his ground, had it not been for an accident. He had been lately joined by three Turkish commanders, each of whom had a body of 10,000 men under his command. After his victories over the Moguls, these officers demanded the greatest share of the spoils; which being refused, they separated themselves from the sultan. He used his utmost endeavours to make them hearken to reason; and sent several messages and letters to them, representing the inevitable ruin which must attend their separation, as Jenghiz Khan was advancing against them with his whole army. At last they were persuaded to lay aside their animosities: but it was now too late; for Jenghiz Khan, being informed of what passed, detached 60,000 horse to prevent their joining the sultan's army; who, finding himself deprived of this powerful aid, retired towards the river Indus. When he was arrived there, he stopped in a place where the stream was most rapid and the place confined, with a view both to prevent his soldiers from placing any hopes of safety in flight, and to hinder the whole Mogul army from attacking him at once. Ever since his departure from Gazna he had been tormented with a colic: yet, at a time when he suffered most, hearing that the enemy's vanguard was arrived at a place in the neighbourhood called *Herder*, he quitted his litter, and, mounting a horse, marched with some of his chosen soldiers in the night; surprised the Moguls in their camp; and having cut them almost all in pieces, without the loss of a single man on his side, returned with a considerable booty.

Jenghiz Khan, finding by this that he had a vigilant enemy to deal with, proceeded with great circumspection. When he came near the Indus, he drew out his army in battalia: to Jagatay, one of his sons, he gave the command of the right wing; to Oktay, another son, he gave the command of the left: and put himself in the centre, with 6000 of his guards. On the other side, Jaloloddin prepared for battle like one who had no resource but in victory. He first sent the boats on the Indus farther off; reserving only one to carry over his mother, wife, and children: but unfortunately the boat split when they were going to embark, so that they were forced to remain in the camp. The sultan took to himself the command of the main body of the army. His left wing, drawn up under shelter of a mountain which hindered the whole right wing of the Moguls from engaging at once, was commanded by his vizir; and his right by a lord named *Amir Malek*. This lord began the fight; and forced the enemy's left wing, notwithstanding the great disparity of numbers, to give ground. The right wing of the Mo-

Gazna.

Gazna.

Moguls likewise wanting room to extend itself, the sultan made use of his left as a body of reserve, detaching from thence some squadrons to the assistance of the troops who stood in need of them. He also took one part of them with him when he went at the head of his main-body to charge that of Jenghiz Khan; which he did with so much resolution and vigour, that he not only put it in disorder, but penetrated into the place where Jenghiz Khan had originally taken his station: but that prince, having had a horse killed under him, was retired from thence, to give orders for all the troops to engage.

This disadvantage had like to have lost the Moguls the battle; for a report being immediately spread that the enemy had broken through the main body, the troops were so much discouraged, that they would certainly have fled, had not Jenghiz Khan encouraged them by riding from place to place in order to show himself. At last, however, Jaloloddin's men, who were in all but 30,000, having fought a whole day with ten times their number, were seized with fear, and fled. One part of them retired to the rocks which were on the shore of Indus, where the enemy's horse could not follow them; others threw themselves into the river, where many were drowned, though some had the good fortune to cross over in safety; while the rest, surrounding their prince, continued the fight through despair. The sultan, however, considering that he had scarce 7000 men left, began to think of providing for his own safety: therefore, having bidden a final adieu to his mother, wife, and children, he mounted a fresh horse, and spurred him into the river, which he crossed in safety, and even stopped in the middle of it to insult Jenghiz Khan, who was now arrived at the bank. His family fell into the hands of the Moguls; who killed all the males, and carried the women into captivity.

Jaloloddin being now securely landed in India, got up into a tree, in order to preserve himself from wild beasts. Next day, as he walked melancholy among the rocks, he perceived a troop of his soldiers, with some officers, three of whom proved to be his particular friends. These, at the beginning of the defeat, had found a boat in which they had sailed all night, with much danger from the rocks, shelves, and rapid current of the river. Soon after, he saw 300 horse coming towards him; who informed him of 4000 more that had escaped by swimming over the river; and these also soon after joined the rest. In the meantime an officer of his household, named *Jamalarrazad*, knowing that his master and many of his people were escaped, ventured to load a very large boat with arms, provisions, money, and stuff to clothe the soldiers; with which he crossed the river. For this important service Jaloloddin made him steward of his household, and surnamed him the *Chosen*, or the *Glory of the faith*. For some time after, the sultan's affairs seemed to go on prosperously: he gained some battles in India; but the princes of that country, envying his prosperity, conspired against him, and obliged him to repass the Indus. Here he again attempted to make head against the Moguls; but was at last defeated and killed by them, and a final end put to the once mighty empire of Gazna.

N^o 135.

The metropolis was reduced by Oktay; who no sooner entered the country in which it was situated, than he committed the most horrid cruelties. The city was well provided with all things necessary for sustaining a siege; had a strong garrison, and a brave and resolute governor. The inhabitants, expecting no mercy from Jenghiz Khan, who they knew had sworn their ruin, were resolved to make a desperate defence. They made frequent sallies on the besiegers, several times overthrew their works, and broke above 100 of their battering rams. But one night, after an obstinate fight, part of the city-walls fell down; and a great number of Moguls having filled up the ditch, entered the city sword-in-hand. The governor perceiving all was lost, at the head of his bravest soldiers rushed into the thickest of his enemies, where he and his followers were all slain. However, Gazna was not entirely destroyed, nor were the people all killed; for after the massacre had continued four or five hours, Oktay ordered it to cease, and taxed those who were left alive at a certain rate, in order to redeem themselves and the city. It does not, however, appear that after this time the city of Gazna ever made any considerable figure.—It was taken by the Moguls in the year 1222.

GEBRES. See GABRES.

GECCO, in natural history, a name given by the Indians to their terrible poison, which kills when mixed with the blood in ever such a small quantity. They say that this gecco is a venomous froth or humour vomited out of the mouths of their most poisonous serpents; which they procure in this fatal strength, by hanging up the creatures by the tails, and whipping them to enrage them: they collect this in proper vessels as it falls; and when they would use it, they either poison a weapon with it, or wounding any part of the flesh introduce the smallest quantity imaginable into it; and this is said to be immediate death.

GECKO. See LACERTA.

GED (William), an ingenious though unsuccessful artist, who was a goldsmith in Edinburgh, deserves to be recorded for his attempt to introduce an improvement in the art of printing. The invention, first practised by Ged in 1735, was simply this. From any types of Greek or Roman, or any other character, he formed a plate for every page, or sheet, of a book, from which he printed, instead of using a type for every letter, as is done in the common way. This was first practised, but on blocks of wood, by the Chinese and Japanese, and pursued in the first essays of Coster the European inventor of the present art. "This improvement (says James Ged the inventor's son) is principally considerable in three most important articles, viz. expence, correctness, beauty and uniformity." But these improvements are controverted.

In July 1729, William Ged entered into partnership with William Fenner, a London stationer, who was to have half the profits, in consideration of his advancing all the money requisite. To supply this, Mr John James, then an architect at Greenwich (who built Sir Gregory Page's house, Bloomsbury church, &c.) was taken into the scheme, and afterwards his brother Mr Thomas James, a letter-founder, and James Ged the inventor's son. In 1730, these partners applied to the university of Cambridge for printing bibles and

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||
Ged.

and common-prayer books by blocks instead of single types; and, in consequence, a leaf was sealed to them April 23d 1731. In their attempt they sunk a large sum of money, and finished only two prayer-books; so that it was forced to be relinquished, and the leaf was given up in 1738. Ged imputed his disappointment to the villany of the pressmen and the ill treatment of his partners (which he specifies at large), particularly Fenner, whom John James and he were advised to prosecute, but declined it. He returned to Scotland in 1733, where he gave his friends a specimen of his performance, by an edition of Sallust. But being still unsuccessful, and having failed in obtaining redress from Fenner, who died insolvent, he was preparing again to set out for London, in order to join with his son James as a printer there, when he died October 19. 1749. Thus ended his life and project; which, ingenious as it seems, is not likely to be revived, if, as Mr Mores suggests, "it must, had it at first succeeded, have soon sunk under its own burden," for reasons needless here to recapitulate.

GEDDES (James), born of a respectable family in Scotland in 1710, was educated for and practised at the bar several years; but died of a consumption before he arrived at the age of 40. He published *An essay on the composition and manner of writing of the ancients*; and left behind him several other tracts.

GEHENNA, a scripture term, which has given some pain to the critics. It occurs in St Matthew v. 22. 29. 30. x. 28. xviii. 9. xxiii. 15. 33. Mark ix. 43. 45. 47. Luke xii. 5. James iii. 6.

The authors of the Louvain and Geneva versions retain the word *gehenna* as it stands in the Greek; the like does M. Simon: the English translators render it by *hell* and *hell-fire*, and so do the translators of Mons and father Bohours.

The word is formed from the Hebrew *gehinnom*, i. e. "valley of Hinnom." In that valley, which was near Jerusalem, there was a place named *Tophet*, where some Jews sacrificed their children to Moloch, by making them pass through the fire. King Josias, to render this place for ever abominable, made a cloaca or common sewer thereof, where all the filth and carcases in the city were cast.

The Jews observe farther, that there was a continual fire kept up there, to burn and consume those carcases; for which reason, as they had no proper term in their language to signify *hell*, they made use of that of *gehenna* or *gehinnom*, to denote a fire unextinguishable.

GELA (anc. geog.), a city of great extent on the south of Sicily, taking its name from the river Gelas, which washes it. It was built by colonists from Rhodes and Crete, 45 years after the building of Syracuse, or in the third year of the 22d Olympiad, 690 before Christ; originally called *Lindii*, from the colonists of *Lindus*, a city of Rhodes, who settled there first. Now *Terranuova*, and the river called *Fiume di Terranuova*. The people were called *Geloi*, *Gelenfes*, and *Gelani*. The city Gela, after having stood 408 years, was destroyed by Phintias, tyrant of Agrigento; and the inhabitants were removed to a new city, called *Phintias* after his name.

GELATINA, JELLY. See JELLY.

GELATINOUS, among the physicians, is applied
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to any thing approaching to the glutinous consistence of a jelly.

GELD, in the English old customs, a Saxon word signifying *money*, or *tribute*. It also denoted a compensation for some crime committed: Hence *wergeld*, in their ancient laws, was used for the value of a man slain; and *orfgeld*, of a beast.

GELDENHAUR (Gerard), in Latin *Geldenbarius*, an historian and Protestant divine in the 16th century. He was a native of Nimeguen, and studied classical learning at Deventer. He went through his course of philosophy at Louvaine, where he contracted a very strict friendship with several learned men, and particularly with Erasmus. He became reader and historian to Charles of Austria, and afterwards to Maximilian of Burgundy. At length he embraced the Protestant religion; taught history at Marburg; and afterwards divinity till his death, in 1542. He wrote, 1. History of Holland. 2. History of the Low Countries; 3. History of the bishops of Utrecht: and other works.

GELDERLAND. See GUELDERLAND.

GELDERS. See GUELDRÉS.

GELDING, the operation of castrating any animal, particularly horses.

If the operation is to be performed on a colt, he may be gelded at nine or fifteen days old, if the testicles be come down; in regard the sooner he is gelt the better it will be for his growth, shape, and courage; though a horse may be gelt at any age, if proper care is taken in the cure.

The manner of gelding is as follows. The beast being cast down on some soft place, the operator takes the stones between his foremost and his great finger, and sitting the cod presses the stones forth; then taking a pair of nippers made very smooth, either of steel, box, or brasil-wood, he claps the strings of the stones between them, very near to where the stones are set on, and presses them so hard that there may be no flux of blood; then with a thin, drawing, cauterising iron, sears away the stone. This done, he takes a hard plaster made of rosin, wax, and washed turpentine, well dissolved together, and melts it on the head of the strings: he then sears them, and melts more of the salve, till such time as he has laid a good thickness of it upon the strings.

When is this done to one stone, the nippers are loosened, and the like is done to the other; and the two slits of the cod are then filled with white salt, and the outside of the cod is anointed with hog's grease: and thus they let him rise, and keep him in a warm stable, without tying him up. If he swells much in his cods or sheath, they chafe him up and down, and make him trot for an hour in a day, which soon recovers him.

The manner of gelding a hog is as follows: The operator, after having made two cross slits or incisions on the midst of the stones, presses them out, and anoints the fore with tar. But another general method, yet somewhat more dangerous if not well done, is, first to cut the stone on the top, and after having drawn that one forth, the operator puts in his fingers at the same slit, and with a lancet cuts the skin between the two stones, and by that slit presses out the

Gele'e
Gellibrand

other stone. Then having cleaned out the blood, he anoints the part with fresh grease: and thus there is but one incision made in the cod. Boar-pigs ought to be gelt about six months old; yet they are commonly gelded about three weeks or a month old.

GELEE (Claude). See CLAUDE.

GELENHAUSEN, a small imperial town of Wetteravia in Germany, with a castle built by the emperor Frederic I. E. Long. 8. 13. N. Lat. 50. 20.

GELENIUS (Sigismund), a learned and excellent man, born of a good family at Prague, about the year 1498. Erasmus conceiving an esteem for him at Basil, recommended him to John Frobenius as a corrector for his printing-house; which laborious charge he accepted, and had a great number of Hebrew, Greek, and Latin books to correct: he also translated many works himself from the Greek into Latin; and published a dictionary in four languages, Greek, Latin, German, and Slavonian. Profitable and honourable employments were offered him in other places, but nothing could tempt him to quit his peaceful situation at Basil. He died in 1555. All his translations are highly esteemed.

GELINOTTE, or GRUS, in ornithology. See TETRAO.

GELLERT (Christian), one of the finest geniuses Germany has produced, was born at Hænichen, near Freyburg in Saxony, in 1715, and studied at Leipzig; at which university he was for many years professor of philosophy and the belles lettres. He early distinguished himself by his talent for poetry; and contracted a strict friendship with the most learned and polite writers in Germany. All his works are filled with sentiment, and bear the impression of the sweetness of his disposition. The most considerable of them are his comedies, his spiritual songs, and moral poems, and particularly his sacred odes, his fables, and his tales. He died in 1769, much lamented.

GELLI (John Baptist), an eminent Italian writer, was born of mean parents at Florence, in the year 1498. He was bred a taylor: but had such an extraordinary genius, that he acquired several languages, and made an uncommon progress in the belles lettres; and though he continued always to work at his trade, became acquainted with all the wits and learned men at Florence, and his merit was universally known. He was chosen a member of the academy there, and the city made him a burgher. He acquired the highest reputation by his works, which are, 1. *I. Capricci del Bottaio*, quarto; which contains ten dialogues. 2. *La Circe*, octavo. This, which also contains ten dialogues, and treats of human nature, has been translated into Latin, French, and English. 3. *Dissertations in Italian on the poems of Dante and Petrarch*. 4. The comedies of *La Sporta* and *La Errore*; and other works. He died in 1563.

GELLIBRAND, (Henry), a laborious astronomer of the last century, was born in 1597. Though he was not without good views in the church, yet he became so enamoured with mathematical studies, that on the death of his father he became a student at Oxford, contented himself with his private patrimony, and devoted himself solely to them. On the death of Mr Gunter, he was recommended by Mr Briggs to the trustees of Gresham college, for the astronomical professorship there; to which he was elected in 1627.

His friend Mr Briggs dying in 1630, before he had finished his *Trigonometrica Britannica*, it was finished by Gellibrand at his request. He wrote several other things, chiefly tending to the improvement of navigation; and died in 1636.

GELLIUS (Aulus), a celebrated grammarian, who lived in the 2d century under Marcus Aurelius and some succeeding emperors. He wrote a collection of observations on authors, for the use of his children; and called it *Noctes Atticae*, because composed in the evenings of a winter he spent at Athens. The chief value of it, is for preserving many facts and monuments of antiquity not to be found elsewhere. Critics and grammarians have bestowed much pains on this writer.

GELLY. See JELLY.

GELO, or GELON, a son of Dinomenes who made himself absolute at Syracuse 484 years before the Christian era. He conquered the Carthaginians at Himera, and made his oppression popular by his great equity and moderation. He reigned seven years, and his death was universally lamented at Syracuse. He was called the father of his people, and the patron of liberty, and honoured as a demigod. His brother Hiero succeeded him. See SYRACUSE.

GELLY. See JELLY.

GEM, in natural history, a common name for all precious stones; of which there are two classes, the pellucid and semipellucid.

The bodies composing the class of pellucid gems are bright, elegant, and beautiful fossils, naturally and essentially compound, ever found in small detached masses, extremely hard, and of great lustre.

The bodies composing the class of semipellucid gems, are stones naturally and essentially compound, not inflammable nor soluble in water, found in detached masses, and composed of crystalline matter debased by earth; however, they are but slightly debased, and are of great beauty and brightness, of a moderate degree of transparency, and are usually found in small masses.

The knowledge of gems depends principally on observing their hardness and colour. Their hardness is commonly allowed to stand in the following order: The diamond the hardest of all; then the ruby, sapphire, jacinth, emerald, amethyst, garnet, carnel, chalcodony, onyx, jasper, agate, porphyry, and marble. This difference, however, is not regular and constant, but frequently varies. Good crystals may be allowed to succeed the onyx; but the whole family of metallic glassy fluors seem to be still softer.—In point of colour, the diamond is valued for its transparency, the ruby for its purple, the sapphire for its blue, the emerald for its green, the jacinth for its orange, the amethyst carnel for its carnation, the onyx for its tawny, the jasper, agate, and porphyry, for their vermilion, green, and variegated colours, and the garnet for its transparent blood-red.

All these gems are sometimes found coloured and spotted, and sometimes quite limpid and colourless. In this case the diamond-cutter or polisher knows how to distinguish their different species by their different degrees of hardness upon the mill. For the cutting or polishing of gems, the fine powder of the fragments of those that are next in degree of hardness is always required to grind away the softer; but as none of them are harder than the diamond, this can only be polished by its own powder.

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Cronstedt observes of gems in general, that the colour of the ruby and emerald are said to remain in the fire, while that of the topaz flies off: hence it is usual to burn the topaz, and thence substitute it for the diamond. "Their colours (says our author) are commonly supposed to depend upon metallic vapours; but may they not more justly be supposed to arise from a phlogiston united with a metallic or some other earth? because we find that metallic earths which are perfectly well calcined give no colour to any glass; and that the manganese, on the other hand, gives more colour than can be ascribed to the small quantity of metal which is to be extracted from it." M. Magellan is of opinion, that their colour is owing chiefly to the mixture of iron which enters their composition; but approves the sentiment of Cronstedt, that phlogiston has a share in their production, it being well known that the calces of iron when dephlogisticated produce the red and yellow colours of marble, and when phlogisticated to a certain degree produce the blue or green colours.

With regard to the texture of gems, M. Magellan observes, that all of them are foliated or laminated, and of various degrees of hardness. Whenever the edges of these laminæ are sensible to the eye, they have a fibrous appearance, and reflect various shades of colour, which change successively according to their angular position to the eye. These are called by the French *chatorantes*; and what is a blemish in their transparency, often enhances their value on account of their scarcity. But when the substance of a gem is composed of a broken texture, consisting of various sets of laminæ differently inclined to each other, it emits at the same time various irradiations of different colours, which succeed one another according to their angle of position. This kind of gems has obtained the name of *opals*, and are valued in proportion to the brilliancy, beauty, and variety of their colours. Their crystallization, no doubt, depends on the same cause which produces that of salts, earths, and metals, which is treated of under the article CRYSTALLIZATION: but as to the particular configuration of each species of gems, we can hardly depend upon any individual form as a criterion to ascertain each kind; and when we have attended with the utmost care to all that has been written on the subject, we are at last obliged to appeal to chemical analysis, because it very often assumes various forms. The following table shows the component parts of gems according to the analysis of Bergman and M. Achard; the letter B prefixed to each denoting Bergman's analysis, and A that of Achard.

	Argil.	Silic.	Calc.	Iron.
Red oriental ruby,	B 40	39	9	10
Ditto,	A 37.5	42.5	9	11
Blue oriental sapphire,	B 58	35	5	2
Ditto,	A 58	33	6	3
Yellow topaz from Saxony,	B 46	39	8	6
Green oriental emerald,	B 60	24	8	6
Ditto,	A 60	23	10	7
Yellow-brown orient. hyacinth,	B 40	25	20	13
Ditto,	A 42	22	20	16
Tourmalin from Ceylon,	B 39	37	15	9
Ditto from Brasil,	B 50	34	11	5
Ditto from Tyrol,	B 42	40	12	6
Garnet from Bohemia,	A 30	48	11	10

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The chrysoprase from Koseinitz in Silesia was likewise analysed by M. Achard; who found that it contained 456 grains of siliceous earth, 13 of calcareous, 6 of magnesia, 3 of copper, and 2 of iron. "This (says M. Magellan) seems to be the only gem that contains no argillaceous earth."

Imitation or Counterfeiting of GEMS in Glass. The art of imitating gems in glass is too considerable to be passed without notice: some of the leading compositions therein we shall mention upon the authority of Neri and others.

These gems are made of pastes; and are noway inferior to the native stones, when carefully made and well polished, in brightness or transparency, but want their hardness.

The general rules to be observed in making the pastes are these: 1. That all the vessels in which they are made be firmly luted, and the lute left to dry before they are put into the fire. 2. That such vessels be chosen for the work as will bear the fire well. 3. That the powders be prepared on a porphyry stone; not in a metal mortar, which would communicate a tinge to them. 4. That the just proportion in the quantity of the several ingredients be nicely observed. 5. That the materials be all well mixed; and, if not sufficiently baked the first time, to be committed to the fire again, without breaking the pot: for if this be not observed, they will be full of blisters and air-blisters. 6. That a small vacuity be always left at the top of the pot, to give room to the swelling of the ingredients.

To make paste of extreme hardness, and capable of all the colours of the gems, with great lustre and beauty.—Take of prepared crystal, ten pounds; salt of pulverine, six pounds; sulphur of lead, two pounds; mix all these well together into a fine powder; make the whole with common water into a hard paste; and make this paste into small cakes of about three ounces weight each, with a hole made in their middle; dry them in the sun, and afterwards calcine them in the straitest part of a potter's furnace. After this, powder them, and levigate them to a perfect fineness on a porphyry-stone, and set this powder in pots in a glass-furnace to purify for three days: then cast the whole into water, and afterwards return it into the furnace, where let it stand 15 days, in which time all foulness and blisters will disappear, and the paste will greatly resemble the natural jewels. To give this the colour of the emerald, add to it brasa thrice calcined; for a sea-green, brasa simply calcined to a redness; for a sapphire, add zaffer, with manganese; and for a topaz, manganese and tartar. All the gems are thus imitated in this, by the same way of working as the making of coloured glasses; and this is so hard, that they very much approach the natural gems.

The colour of all the counterfeit gems made of the several pastes, may be made deeper or lighter, according to the work for which the stones are designed; and it is a necessary general rule, that small stones for rings, &c. require a deeper colour, and large ones a paler. Besides the colours made from manganese, verdegri, and zaffer, which are the ingredients commonly used, there are other very fine ones which care and skill

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may prepare. Very fine red may be made from gold, and one not much inferior to that from iron; a very fine green from brass or copper; a sky-colour from silver, and a much finer one from the granates of Bohemia.

A very singular and excellent way of making the paste to imitate the coloured gems is this: Take a quantity of saccharum saturni, or sugar of lead, made with vinegar in the common way; set it in sand, in a glass body well luted from the neck downwards; leave the mouth of the glass open, and continue the fire 24 hours; then take out the salt, and if it be not red but yellowish, powder it fine, and return it into the vessel, and keep it in the sand-heat 24 hours more, till it becomes as red as cinnabar. The fire must not be made so strong as to melt it, for then all the process is spoiled. Pour distilled vinegar on this calcined salt, and separate the solution from the dregs; let the decanted liquor stand six days in an earthen vessel, to give time for the finer sediment to subside; filter this liquor, and evaporate it in a glass body, and there will remain a most pure salt of lead; dry this well, then dissolve it in fair water; let the solution stand six days in a glazed pan; let it subside, then filter the clear solution, and evaporate it to a yet more pure white and sweet salt; repeat this operation three times; put the now perfectly pure salt into a glass vessel, set it in a sand-heat for several days, and it will be calcined to a fine impalpable powder, of a lively red. This is called *the sulphur of lead*.

Take all the ingredients as in the common composition of the pastes of the several colours, only instead of red lead, use this powder; and the produce will well reward the trouble of the operation, as experience has ten proved.

A paste proper for receiving colours may be readily made by well-pounding and mixing six pounds of white sand cleansed, three pounds of red lead, two pounds of purified pearl-ashes, and one pound of nitre. A softer paste may be made in the same manner, of six pounds of white sand cleansed; red lead, and purified pearl-ashes, of each three pounds; one pound of nitre, half a pound of borax, and three ounces of arsenic. For common use a pound of common salt may be substituted for the borax. This glass will be very soft, and will not bear much wear if employed for rings, buckles, or such imitations of stones as are exposed to much rubbing; but for ear-rings, ornaments worn on the breast, and those little used, it may last a considerable time.

In order to give paste different colours, the process is as follows. For

Amethyst. Take ten pounds of either of the compositions described under *Colouring of Glass*, one ounce and a half of manganese, and one dram of zaffer; powder and fuse them together.

Black. Take ten pounds of either of the compositions just referred to, one ounce of zaffer, six drams of manganese, and five drams of iron, highly calcined; and proceed as before.

Blue. Take of the same composition ten pounds; of zaffer six drams; and of manganese two drams; and proceed as with the foregoing.

Chrysolite. Take of either of the compositions for paste above described, prepared without saltpetre, ten

pounds, and of calcined iron five drams; and pursue the same process as with the rest.

Red Cornelian. Take of the compositions mentioned under *Colouring of Glass* two pounds; of glass of antimony one pound; of the calcined vitriol called *scarlet oker* two ounces; and of manganese one dram. Fuse the glass of antimony and manganese with the composition; then powder them, and mix them with the other, by grinding them together, and fuse them with a gentle heat.

White Cornelian. Take of the composition just referred to two pounds; and of yellow oker well washed two drams; and of calcined bones one ounce. Mix them, and fuse them with a gentle heat.

Diamond. Take of the white sand six pounds; of red-lead four pounds; of pearl ashes purified three pounds; of nitre two pounds; of arsenic five ounces; and of manganese one scruple. Powder and fuse them.

Eagle-marine. Take ten pounds of the composition under *GLASS*; three ounces of copper highly calcined with sulphur; and one scruple of zaffer. Proceed as before.

Emerald. Take of the same composition with the last nine pounds; three ounces of copper precipitated from aquafortis; and two drams of precipitated iron. See *EMERALD*.

Garnet. Take two pounds of the composition under *GLASS*; two pounds of the glass of antimony, and two drams of manganese. For vinegar garnet, take of the composition for paste, described in this article, two pounds; one pound of glass of antimony, and half an ounce of iron, highly calcined; mix the iron with the uncoloured paste, and fuse them; then add the glass of antimony powdered, and continue them in the heat till the whole is incorporated.

Gold or full yellow. Take of the composition for paste ten pounds, and one ounce and a half of iron strongly calcined; proceeding as with the others.

Deep purple. Take of either of the compositions for paste ten pounds; of manganese one ounce; and of zaffer half an ounce.

Ruby. Take one pound of either of the compositions for paste, and two drams of *calx Cassii*, or precipitation of gold by tin; powder the paste, and grind the calx of gold with it in a glass, flint, or agate mortar, and then fuse them together. A cheaper ruby paste may be made with half a pound of either of the above compositions, half a pound of glass of antimony, and one dram and a half of the calx of gold; proceeding as before.

Sapphire. Take of the composition for paste ten pounds: of zaffer three drams and one scruple; and of the *calx Cassii* one dram. Powder and fuse them. Or the same may be done, by mixing with the paste one-eighth of its weight of smalt.

Topaz. Take of the compositions under *GLASS* ten pounds, omitting the saltpetre; and an equal quantity of the *Gold-coloured hard GLASS*. Powder and fuse them. See *TOPAZ*.

Turquoise. Take of the composition for blue paste already described, ten pounds; of calcined bone, horn, or ivory, half a pound. Powder and fuse them.

Opake white. Take of the composition for paste ten pounds; and one pound of calcined horn, ivory, or bone; and proceed as before.

Semitransparent white, like opal. See *OPAL*.

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To the above we shall add the following receipts and processes, contained in a Memoir by M. Fontanieu of the Royal Academy of Sciences at Paris, and said to have met with much approbation.

I. *Of the Bases.* Although the different calces of lead are all adapted to produce the same effect in vitrification; yet M. Fontanier prefers lead in scales, and next to that minium, as being the most constantly pure. It is necessary to sift through a silk sieve the preparations of lead one wishes to make use of in the vitrification, in order to separate the grosser parts, as also the lead found in a metallic state when white lead in scales is employed.

The base of factitious gems is calx of lead and rock-crystal, or any other stone vitrifiable by the calces already mentioned. Pure sand, flint, and the transparent pebbles of rivers, are substances equally fit to make glass: but as it is first necessary to break the masses of crystal, stones, or pebbles, into smaller parts; so by this operation particles of iron or copper are frequently introduced, and to these dust or greasy matters are also apt to adhere. Our author therefore begins by putting the pounded crystal or pebbles into a crucible, which he places in a degree of heat capable of making the mass red-hot; he then pours it into a wooden bowl filled with very clear water; and shaking the bowl from time to time, the small portions of coals furnished by the extraneous bodies swim on the surface of the water, and the vitrifiable earth, with the iron, &c. rests on the bottom. He then decants the water; and having dried the mass, he pounds it, sifts the powder through the finest silk sieve: he then digests the powder during four or five hours with marine acid, shaking the mixture every hour. After having decanted the marine acid from the vitrifiable earth, he washes the latter until the water no longer reddens the tincture of tournsol. The said earth being dried, is passed through a silk sieve, and is then fit for use. Nitre, salt of tartar, and borax, are the three species of salts that enter with quartz and the several calces of lead into M. Fontanieu's vitrifications.

Much of the success in the art of making coloured stones depends on the accurate proportion of the substances made use of to form the crystal which serves as a base to the factitious stones. After having tried a great variety of receipts, our author found they might be reduced to the following.

1. Take two parts and a half of lead in scales, one part and a half of rock-crystal or prepared flints, half a part of nitre, as much borax, and a quarter part of glass of arsenic. These being well pulverized and mixed together, are to be put into a Hessian crucible, and submitted to the fire. When the mixture is well melted, pour it into cold water: then melt it again a second and a third time; taking care, after each melting, to throw it into fresh cold water, and to separate from it the lead that may be revived. The same crucible should not be used a second time, because the glass of lead is apt to penetrate it in such a manner as to run the risk of losing the contents. One must also be careful to cover the crucible well, to prevent any coals getting into it, which would reduce the calx of lead, and spoil the composition.

2. Take two parts and a half of white cerufs, one

part of prepared flints, half a part of salt of tartar, and a quarter part of calcined borax: melt the mixture in a Hessian crucible, and then pour it into cold water; it is then to be melted again, and washed a second and a third time, the same precautions being observed as for the first base.

3. Take two parts minium, one part rock-crystal, half a part of nitre, and as much salt of tartar: this mixture being melted, must be treated as the former.

4. Take three parts of calcined borax, one part of prepared rock-crystal, and one part of salt of tartar; these being well mixed and melted together, must be poured into warm water: the water being decanted and the mass dried, an equal quantity of minium must be added to it; it is then to be melted and washed several times as directed above.

5. That called by our author the *Mayence base*, and which he considers as one of the finest crystalline compositions hitherto known, is thus composed: Take three parts of fixed alkali of tartar, one part of rock-crystal or flint pulverized: the mixture to be well baked together, and then left to cool. It is afterwards poured into a crucible of hot water to dissolve the fritt; the solution of the fritt is then received into a stone-ware pan, and aquafortis added gradually to the solution till it no longer effervesces: this water being decanted, the fritt must be washed in warm water till it has no longer any taste: the fritt is then dried, and mixed with one part and a half of fine cerufs or white lead in scales; and this mixture must be well levigated with a little distilled water. To one part and a half of this powder dried add an ounce of calcined borax: let the whole be well mixed in a marble mortar, then melted and poured into cold water as the other bases already described. These fusions and lotions having been repeated, and the mixture dried and powdered, a 12th part of nitre must be added to it, and then melted for the last time; when a very fine crystal will be found in the crucible.

6. As a composition for furnishing very fine white stones: Take eight ounces of cerufs, three ounces of rock-crystal pulverized, two ounces of borax finely powdered, and half a grain of manganese; having melted and washed this mixture in the manner directed above, it will produce a very fine white crystal.

II. *Of the Colours.* The calces of metals, as already observed, are the substances employed to colour factitious gems; and on the preparation of these calces depends the vividness of their colours.

a, *From Gold.*] To obtain the mineral purple known by the name of *precipitate of Cassius*, M. Fontanieu employs the following different processes.

1. Dissolve some pure gold in aqua regia, prepared with three parts of precipitated nitrous acid and one part of marine acid; and to hasten the dissolution, the matras should be placed in a sand-bath. Into this solution pour a solution of tin in aqua regia. The mixture becomes turbid, and the gold is precipitated with a portion of the tin, in the form of a reddish powder; which, after being washed and dried, is called *precipitate of Cassius*.—The aqua regia employed to dissolve the tin is composed of five parts nitrous acid and one part of marine acid: to eight ounces of this aqua regia are added sixteen ounces of distilled

Gem.

distilled water. Some leaves of Malacca tin, about the size and thickness of a sixpence, is then put into this diluted aqua regia, till it will dissolve no more of them: which operation, our author observes, requires commonly twelve or fourteen days; though it might probably be hastened by beating the tin still thinner, and then rolling it into the form of a hollow cylinder, or turning it round into spiral convolutions, and thus exposing a greater extent of surface to the action of the menstruum. In order to prepare more readily the precipitate of Cassius, M. Fontanieu puts into a large jug eight ounces of solution of tin, to which he adds four pints of distilled water: he afterwards pours into this metallic lye some solution of gold, drop by drop, taking care to stir the whole with a glass tube: when the mixture becomes of a deep purple colour, he ceases dropping the solution of gold; and in order to hasten the precipitation of the mineral purple, pours into the mixture a pint of fresh urine. Six or seven hours after, the precipitate is collected at the bottom of the vessel: the fluid is then decanted; and the precipitate, washed once or twice, is dried till it becomes a brown powder.

2. Pour into a vessel of fine tin with a thick bottom four ounces of the solution of gold; three minutes after add two pints of distilled water. Let this mixture stand in the tin vessel during seven hours, taking care to stir it every hour with a glass tube; afterwards pour it into a conical glass jug, and add to it a pint of new urine: the mineral purple is soon precipitated, and then is to be washed and dried.

3. Distil in a glass cornute placed in a bath of ashes, some gold dissolved in aqua regia, made with three parts nitrous and one part marine acid; when the acid is passed over and the gold contained in the cornute appears dry, leave the vessel to cool, then pour into it some new aqua regia, and proceed to distil as before. Replace the aqua regia twice upon the gold and distil the same. After these four operations, pour by little and little into the cornute some oil of tartar *per deliquium*, which will occasion a brisk effervescence: when this ceases, distil the mixture till it becomes dry, and then put some warm water into the cornute. Shake the whole, and pour it into a cucurbit, when a precipitate is deposited the colour of which is sometimes brown and sometimes yellow: After having washed this precipitate, dry it. Our author says, this mineral purple was much superior to the foregoing, since two grains of it only were sufficient to an ounce of the base, whilst it required of the other two a 20th part of the base. And he adds, that he found a means of exalting the colour of the precipitate of Cassius, by putting to it a sixth part of its weight of glass of antimony finely powdered, and of nitre in the proportion of a dram to eight ounces of the base.

4. From Silver.] The calx of silver, being vitrified, produces a yellowish grey colour. This calx enters only into the composition of the yellow artificial diamond and the opal. M. Fontanieu introduces it into the base in the form of luna cornea.

In order to prepare it, he directs to dissolve the silver in precipitated nitrous acid, and afterwards to pour into it a solution of sea salt: a white precipitate is obtained; which, being washed and dried, melts very readily in the fire, and is soon volatilized if not

mixed with vitrifiable matters. To make the yellow diamond, 25 grains of this luna cornea are put to an ounce of the fourth base: the dose of silver may be diminished according to the shade of yellow that one wishes to procure.

c, From Copper.] The calx of copper imparts to white glass the finest green colour; but if this metal be not exactly in a state of calx, it produces a brownish red colour. *Mountain blue, verdigris*, and the residue of its distillation, are the different preparations of copper which our author employs to make the artificial emeralds.

d, From Iron.] Although it has been asserted, that the calces of iron introduce a very fine transparent red colour into white glass, M. Fontanieu could only obtain from it a pale red a little opaque. The calx of iron that he employed was in the proportion of the 20th part of the base.

There are several ways of preparing the calx of iron called *crocus Martis*, or *saffron of Mars*. In general, it is necessary that this metal be so far deprived of its phlogiston, that the magnet ceases to attract it: thus one may use the scales of iron found upon the bars of the furnaces, which serve to distil aquafortis. By digesting filings of steel with distilled vinegar, then evaporating and replacing the vinegar 10 or 12 times upon these filings and drying them alternately, a calx of iron is obtained, which must be sifted through a silk sieve, and then calcined. The calx of iron thus obtained by the vinegar, our author says, only introduced into his bases a green colour inclining to a yellow.

By the following process a saffron of Mars of the finest red colour is obtained: Let an ounce of iron filings be dissolved in nitrous acid in a glass cornute, and distilled over a sand-bath to dryness. After having replaced the acid or the dry calx, and re-distilled it a second and a third time, it is thenedulcorated with spirits of wine, and afterwards washed with distilled water.

e, From the Magnet.] It is necessary to calcine the magnet before it be introduced into the vitrifications: Having therefore torrifed the magnet during two hours, it must be washed and dried. It is only employed in the composition of the opal.

f, From Cobalt.] The calx of cobalt is only proper to introduce a blue colour into glass; but this semimetal is rarely found free from iron and bismuth, and therefore it is first necessary to separate them from it. This is done by calcining the ore of cobalt in order to disengage the arsenic: afterwards the calx must be distilled in a cornute with sal ammoniac, and the iron and the bismuth are found sublimed with this salt. The distillation must be repeated with the sal ammoniac till this salt is no longer coloured yellow. The cobalt which remains in the cornute is then calcined in a potsherd, and becomes a very pure calx; which being introduced into the base, in the proportion of a goodth part, gives it a very fine blue colour, the intensity of which may be increased at discretion by the addition of calx of cobalt. In order to prepare *black enamel* resembling that which is called *black agate* of Iceland; melt together a pound and a half of one of the bases, two ounces of the calx of cobalt, two ounces of

crocus

Gem.

Gem. *crocus Martis*, prepared with vinegar, and two ounces of manganese.

g, From Tin.] The calx of tin is not vitrifiable alone, and when deprived of phlogiston is of a white colour; it renders opaque the glass with which it is melted, and forms white enamel. For this purpose, calcine the putty of tin; then wash and dry it, and sift it through a silk sieve. Take six pounds of the second base, the same quantity of the calcined putty of tin, and 48 grains of manganese.

h, From Antimony.] Antimony is only susceptible of vitrification when its calx contains phlogiston, and then it produces a reddish or hyacinth coloured glass; but if the antimony be in a state of absolute calx, such as the diaphoretic antimony, then it is no longer vitrifiable, and may be substituted for calx of tin to make white enamel. M. Fontanieu introduces the glass of antimony in the composition of artificial topazes. For the *oriental topaz*, he takes 24 ounces of the first bases and five drachms of the glass of antimony. To imitate the *topaz of Saxony*, he adds to each ounce of the base five grains of the glass of antimony. For the *topaz of Brazil*, he takes 24 ounces of the first base, one ounce 24 grains of glass of antimony, and 8 grains of the *precipitate of Cassius*.

i, From Manganese.] This mineral, employed in a small quantity, renders the glass whiter; a larger quantity produces a very fine violet colour, and a still larger dose of it renders the glass black and opaque.

There are two ways of preparing manganese, 1. The most simple consists in exposing it to a red heat, and then quenching it with distilled vinegar; it is afterwards dried and powdered, in order to pass it through a silk sieve. 2. Haudiquier de Blancour describes the second manner of preparing the manganese, proper to furnish a red colour, and names it *fusible manganese*. Take of manganese of Piedmont one pound; torrify and pulverize it; then mix it with a pound of nitre, and calcine the mixture during 24 hours; afterwards wash it repeatedly in warm water, till the water of the lyes has no longer any taste; dry the manganese, and mix with it an equal weight of sal ammoniac; levigate this mixture on a slab of porphyry with oil of vitriol diluted with water to the strength of vinegar. Dry the mixture, and introduce it into a cornute; distil by a graduated fire; and when the sal ammoniac is sublimed, weigh it, and add to the mixture an equal quantity. Then distil and sublime as before, and repeat the operation six times, being careful at each time to mix the sal ammoniac and the manganese upon the porphyry with diluted oil of vitriol.

At Tournhault in Bohemia, there is sold a fusible glass of a yellow colour, very like that of the topaz of Brazil, which, when exposed to a degree of fire in a cupel sufficient to redden it, becomes of a very fine ruby colour, more or less deep according to the degree of fire to which it has been exposed. Our author assayed this glass, and found it to contain a great deal of lead, but was not able to discover any gold in it.

III. *Of the different degrees of Fire necessary for Fictitious Gems.* Our author observes, that there are three degrees of heat very different in their energy. The fire kept up in the wind-furnaces in the laboratories of chemists, is

less active than that whose effect is accelerated by the means of bellows; and a fire supported by wood, and kept up during 60 hours without interruption, produces singular effects in vitrification, and renders the glass finer and less alterable.

When recourse is had to the forge, in order to operate a vitrification, it is necessary to turn about the crucible from time to time, that the mass may melt equally. Some coal also should be replaced, in proportion as it consumes towards the *nozel* of the bellows; for without this precaution, we should run the risk of cooling the crucible opposite to the flame, and probably of cracking it, when all the melted mass running among the coals would be totally lost. Though this is the readiest way of melting, it should not be employed out of choice; for the crucible often breaks, or coals get into it, and reduce the calx of lead to a metallic state.

The wind-furnace is either square or round. A small cake of baked clay or brick, of the thickness of an inch, is placed upon the grate; and upon this cake is placed the crucible, surrounded with coals. The degree of heat produced by this furnace is much less than that of the forge: but in order to succeed in the vitrification, M. Fontanieu recommends the use of a furnace described by Kunckel, which, with some necessary alterations, is represented on Plate CCXX. The interior part is so disposed, that we may place crucibles at three different heights; and the name of *chambers* is given to those steps upon which the crucibles are placed. Fig. 4. is a plan of the kiln at the first chamber, and fig. 5. a plan of the kiln where the fire is placed. Fig. 6. exhibits the elevation; A the ash-pit; B the door to put in the wood; C the door of the first chamber; D the door of the second chamber; E the third chamber; F the flue or chimney; GG iron-hoops which surround the kiln to strengthen it. Fig. 7. is a section of the kiln: H the ash-pit with its air-hole; I the chamber for the fire with an air-hole; K the first chamber for the crucibles; L the second chamber; M the dome; N the chimney; OO air-holes.

It is obvious, that the degree of heat cannot be equal in the said three chambers. The chamber K is that where the heat is greatest, afterwards in that of L, and lastly, in that of M. We should begin by placing the crucibles according to their size, in these different chambers; by which means the best effect in vitrification is produced.

In order to conduct the fire well, only three billets of white wood should be put into the furnace at a time for the first 20 hours, four billets at a time for the next 20 hours, and six billets for the last 20 hours; in all 60 hours. The furnace is then left to cool, care being taken to stop the air-holes with some lute; and, in about 48 hours after, when the kiln is quite cold, the crucible is to be withdrawn.

IV. *The Compositions.* 1. For the white diamond: Take the base of Mayence. This crystal is very pure, and has no colours.

2. For the yellow diamond: to an ounce of the fourth base, add for colour 25 grains of luna cornea or 10 grains of glass of antimony.

3. For the emerald: 1. To 15 ounces of either of the bases, add for colour one dram of mountain-blue and six grains.

Gem. grains of glass of antimony ; or, 2. To an ounce of the second base, add for colour 20 grains of glass of antimony and three grains of calx of cobalt.

4. For the sapphire: To 24 ounces of the Mayence base, add for colour two drams 46 grains of the calx of cobalt.

5. For the amethyst: To 24 ounces of the Mayence base, add for colour four drams of prepared manganese and four grains of precipitate of Cassius.

6. For the emerald: To 24 ounces of the third base, add for colour 96 grains of glass of antimony and four grains of calx of cobalt.

7. For the black agate: To 24 ounces of either of the bases, add two ounces of the mixture directed above in par. f.

8. For the opal: To an ounce of the third base, add for colour 10 grains of luna cornea, two grains of magnet, and 26 grains of absorbent earth.

9. For the oriental topaz: To 24 ounces of the first or third base, add for colour five drams of glass of antimony.

10. For the topaz of Saxony: To 24 of the same base, add for colour six drams of the glass of antimony.

11. For the topaz of Brasil: To 24 ounces of the second or third base, add for colour one ounce 24 grains of the glass of antimony and eight grains of precipitate of Cassius.

12. For the hyacinth: To 24 ounces of the base made with rock-crystal, add for colour two drams 48 grains of glass of antimony.

13. For the oriental ruby: 1. To 16 ounces of the Mayence base, add for colour a mixture of two drams 48 grains of the precipitate of Cassius, the same quantity of crocus Martis prepared in aquafortis, the same of golden sulphur of antimony and of fusible manganese, with the addition of two ounces of mineral crystal; or, 2. To 20 ounces of the base made with flint, add half an ounce of fusible manganese and two ounces of mineral crystal.

14. For the balas ruby: 1. To 16 ounces of the Mayence base, add the above colouring powder, but diminished a fourth part; or, 2. To 20 ounces of the base made with flints, add the same colouring powder, but with a fourth less of the manganese.

The *facitious* gems are easily distinguished from the *natural*, by their softness and fusibility; by their solubility in acids; by their causing only a single refraction of the rays of light; and, in many cases, by their specific gravity, which exceeds 2.76 in all precious gems of the first order, as the diamond, ruby, sapphire, &c.

Imitation of Antique Gems. There has been at different times a method practised by particular persons of taking the impressions and figures of antique gems, with their engravings, in glass of the colour of the original gem. This has always been esteemed a very valuable method, and greatly preferable to the more ordinary ones of doing it on sealing-wax or brimstone: but, to the misfortune of the world, this art being a secret only in the hands of some particular persons who got their bread by it, died with them, and every new artist was obliged to re-invent the method; till at length Mr Homberg, having found it in great perfection, gave the whole process to the world to be no

more forgotten or lost; and since that time it has been very commonly practised in France, and sometimes in other places.

Mr Homberg was favoured in his attempts with all the engraved gems of the king's cabinet; and took such elegant impressions, and made such exact resemblances of the originals, and that in glasses so artfully tinged to the colour of the gems themselves, that the nicest judges were deceived in them, and often took them for the true antique stones. These counterfeit gems also serve, as well as the original ones, to make more copies from afterwards; so that there is no end of the numbers that may be made from one; and there is this farther advantage, that the copy may be easily made perfect, though the original should not be so, but should have sustained some damage from a blow or otherwise.

The great care in the operation is to take the impression of the gem in a very fine earth, and to press down upon this a piece of proper glass, softened or half melted at the fire, so that the figures of the impression made in the earth may be nicely and perfectly expressed upon the glass. In general, the whole process much resembles that of the common founders. But when it is brought to the trial, there is found a number of difficulties which were not to be foreseen, and which would not at all affect the common works of the founder. For his purpose, every earth will serve that is fine enough to receive the impressions, and tough enough not to crack in the drying; these all serve for their use, because the metals which they cast are of a nature incapable of mixing with earth, or receiving it into them, even if both are melted together, so that the metal always easily and perfectly separates itself from the mould; but it is very difficult in these casts of glass. They are composed of a matter which differs in nothing from that of the mould, but that it has been run into this form by the force of fire, and the other has not yet been so run; but is on any occasion ready to be so run, and will mix itself inseparably with the glass in a large fire: consequently, if there be not great care used, as well in the choice of the glass as in the manner of using it, when the whole is finished there will be found great difficulty in the separating the glass from the mould, and often this cannot be done without wholly destroying the impression.

All earths run more or less easily in the fire as they are more or less mixed with saline particles in their natural formation. As all salts make earths run into glass, and as it is necessary to use an earth on this occasion for the making a mould, it being also necessary to the perfection of the experiment that this earth should not melt or run, it is our business to search out for this purpose some earth which naturally contains very little salt. Of all the species of earth which Mr Homberg examined on this occasion, none proved so much divested of salts, or so fit for the purpose, as the common tripela, or *TRIPOLI*, used to polish glass and stones. Of this earth there are two common kinds; the one reddish, and composed of several flakes or strata; the other yellowish, and of a simple structure. These are both to be had in the shops. The latter kind is from the Levant; the former is found in England, France, and many other places. This tripela must be chosen soft and smooth to the touch, and not mixed

with sandy or other extraneous matter. The yellowish kind is the best of the two, and is commonly called *Venetian tripoli*. This receives the impressions very beautifully; and never mixes with the glass in the operation, which the red kind sometimes does. Mr Homberg usually employed both kinds at once in the following manner: first, powder a quantity of the red tripela in an iron mortar, and sifting it through a fine sieve set it by for use; then scrape with a knife a quantity of the yellow tripela into a sort of powder, and afterwards rub it till very fine in a glass mortar with a glass pestle. The finer this powder is, the finer will be the impression, and the more accurately perfect the cast. The artificer might naturally suppose, that the best method to obtain a perfect fine powder of this earth, would be by washing it in water; but he must be cautioned against this. There is naturally in this yellowish tripoli a sort of unctuousity, which when it is formed into a mould keeps its granules together, and gives the whole an uniform glossy surface: now the washing the powder takes away this unctuousity; and though it renders it much finer, it makes it leave a granulated surface, not this smooth one, in the mould; and this must render the surface of the cast less smooth.

When the two tripelas are thus separately powdered, the red kind must be mixed with so much water as will bring it to the consistence of paste, so that it may be moulded like a lump of dough between the fingers: this paste must be put into a small crucible of a flat shape, and about half an inch or a little more in depth, and of such a breadth at the surface as is a little more than that of the stone whose impression is to be taken. The crucible is to be nicely filled with this paste lightly pressed down into it, and the surface of the paste must be strewed over with the fine powder of the yellow tripela not wetted. When this is done, the stone, of which the impression is to be taken, must be laid upon the surface, and pressed evenly down into the paste with a finger and thumb, so as to make it give a strong and perfect impression; the tripela is then to be pressed nicely even to its sides with the fingers, or with an ivory knife. The stone must be thus left a few moments, for the humidity of the paste to moisten the dry powder of the yellow tripela which is strewed over it: then the stone is to be carefully raised by the point of a needle fixed in a handle of wood; and the crucible being then turned bottom upwards, it will fall out, and the impression will remain very beautifully on the tripela.

If the sides of the cavity have been injured in the falling out of the stone, they may be repaired; and the crucible must then be set, for the paste to dry, in a place where it will not be incommoded by the dust.

The red tripoli being the more common and the cheaper kind, is here made to fill the crucible only to save the other, which alone is the substance fit for taking the impression. When the stone is taken out, it must be examined, to see whether any thing be lodged in any part of the engraving, because if there be any of the tripela left there, there will certainly be so much wanting in the impression. When the crucible and paste are dry, a piece of glass must be chosen of a proper colour, and cut to a size proper for the figure; this must be laid over the mould, but in such a manner that it does not touch the figures, otherwise it would spoil them. The crucible is then to be brought

near the furnace by degrees, and gradually heated till it cannot be touched without burning the fingers; then it is to be placed in the furnace under a muffle, surrounded with charcoal. Several of these small crucibles may be placed under one muffle; and when they are properly disposed, the aperture of the muffle should have a large piece of burning charcoal put to it, and then the operator is to watch the process, and see when the glass begins to look bright: this is the signal of its being fit to receive the impression. The crucible is then to be taken out of the fire; and the hot glass must be pressed down upon the mould with an iron instrument, to make it receive the regular impression: as soon as this is done, the crucible is to be set at the side of the furnace out of the way of the wind, that it may cool gradually without breaking. When it is cold, the glass is to be taken out, and its edges should be grated round with pincers, which will prevent its flying afterwards, which is an accident that sometimes happens when this caution has been omitted, especially when the glass is naturally tender. The different coloured glasses are of different degrees of hardness, according to their composition; but the hardest to melt are always the best for this purpose, and this is known by a few trials.

If it be desired to copy a stone in relief which is naturally in creux, or to take one in creux which is naturally in relief; there needs no more than to take an impression first in wax or sulphur, and to mould that upon the paste of tripela instead of the stone itself: then proceeding in the manner before directed, the process will have the desired success.

A more simple and easy method than the above, is by taking the casts in gypsum, or Plaster of Paris as it is commonly called. For this purpose, the gypsum must be finely pulverised, and then mixed with clear water to the consistence of thick cream. This is poured upon the face of the gem or seal of which the impression is wanted, and which must be previously moistened with oil to facilitate the separation of the cast; and in order to confine the liquid plaster, it is only necessary to pin a slip of oiled paper round the sides of the seal by way of a cap or rim. When the plaster is dry, it is to be taken off, and set before the mouth of the furnace, in order to free it entirely from moisture; when it is fit to be used as a matrix in the same way as that formed with the tripoli earths. Only no crucible or other receptacle is at all necessary; the casts being formed like so many small cakes half an inch thick, and thus put into the furnace with the bits of glass upon them. The glass, after coming to a proper heat, is pressed down upon the mould with an iron spatula to receive the desired impression, the pressure requisite being more or less according to the size of the stone. This method has been long practised very successfully, and with no small emolument, by that ingenious seal-engraver Mr Deuchar of Edinburgh. The only respect in which it is inferior to the other more operose and expensive methods, consists in the chance of air-bubbles arising in pouring on the plaster; which chance, however, is less in proportion to the fineness of the gypsum employed. When air-bubbles do occur, the casts may be laid aside, as it is so easy to replace them.

The application of pastes to multiply and preserve the impressions of camaieus and intaglios, is an object very interesting to artists and to antiquaries, as well as to men of learning and taste in the fine arts.

Gem.

This art, though only lately restored in any degree of perfection, is of very considerable antiquity. The great prices which the ancients paid for the elegant gems engraved by the celebrated Greek artists, could not but early suggest to them the idea of multiplying their numbers, by taking off their impressions in wax, in sulphur, in plaster, or in clay; but more particularly in coloured glass, or that vitrified substance commonly called *paste*.

As the impressions on paste are durable, and imitate the colours and brilliancy of the original stones, they serve the same purposes as the gems themselves. This art was therefore practised not only by the Greeks, but by all the nations who cultivated Grecian taste.

Many of the finest gems of antiquity are now lost, and their impressions are to be found only on ancient pastes. Great therefore is the value of these pastes. Numerous collections of them have been formed by the curious. Instances of this are found in the Florentine Museum, in Stofsch's work on ancient gems with inscriptions, in Winckelmann's description of Stofsch's cabinet, and in the noble collection of Mr Charles Townley in London.

The art of taking impressions of gems seems not to have been altogether lost even in the Gothic ages; for Heraclius, who probably lived in the ninth century, and wrote a book *De coloribus et artibus Romanorum*, teaches in very plain though not elegant terms how to make them. Indeed, some of the few persons who then possessed this art, taking advantage of the ignorance of the times, sold pastes for original gems. Thus the famous emerald of the abbey of Reichnaw near Constance, although a present made by Charlemain, is now found to be a piece of glass. And thus the celebrated emerald vase in the cathedral of Genoa is likewise found to be a paste (A). The Genoese got this vase at the taking of Cesarea in the year 1101 as an equivalent for a large sum of money; nor was any imposition then suspected, for in the year 1319 they pawned it for 1200 marks of gold.

But this ingenious art, revived indeed in Italy in the time of Laurence of Medici and Pope Leo X. was not cultivated in an extensive manner till the beginning of the present century, when M. Homberg restored it, as already mentioned. In this he is said to have been greatly assisted and encouraged by the then duke of Orleans regent of France, who used to amuse himself with that celebrated chemist in taking off impressions in paste from the king of France's, from his own, and other collections of gems.

According to the French Encyclopedists, M. Clachant the elder, an engraver of some note, who died at Paris in 1781, learned this art from his royal highness, to whose household his father or he seems to have belonged. Mademoiselle Feloix next cultivated this art, and it is believed still carries it on. She had been taught by her father, who in quality of *garçon de chambre* to the regent had often assisted in the laboratory of his master, where he acquired this knowledge. Her collection consists of 1800 articles.

Gem.

Baron Stofsch, a Prussian, who travelled over Europe in quest of original engraved stones and impressions of ancient gems, for the elegant work which he published and Picart engraved (B), was well acquainted with this art. He had taught it to his servant Christian Dehn, who settled at Rome, where he made and sold his well known sulphur impressions and pastes. He had collected 2500 articles. Dolce has arranged them in a scientific order, and given a descriptive catalogue of them.

It was chiefly from Dehn's collection that the taste for sulphurs and pastes has become so universal. They are great objects of study, and often require much learning to explain them. They have unquestionably served to extend and improve the art of engraving on stones; and have been of infinite use to painters, to statuary, and to other artists, as well as to men of classical learning and fine taste.

It is very difficult to take off impressions, and perfectly to imitate various coloured cameos. It cannot be properly done in wax, sulphur, plaster, or glass of one colour only. The difficulties arising from their size and form, and from the various nature of the different sorts of glass, which do not well unite into different strata, are very numerous: nor could the completest success in this chemical and mechanical branch of the art produce a tolerable cameo. Impressions or imitations, if unassisted by the tool of the engraver, do not succeed; because the undercutting and deep work of most of the originals require to be filled up with clay or wax, that the moulds may come off safe without injuring them. Hence the impressions from these moulds come off hard and destitute of delicacy, sharpness, and precision of outline, till the underworking of the moulder is cut away. But Mr Reiffenstein at Rome, by his genius, perseverance, and the assistance of able artists, has overcome these difficulties; and has had the satisfaction of succeeding, and producing variegated cameos which can hardly be distinguished from the originals.

Mr Lippart of Dresden, an ingenious glazier, and an enthusiast in the fine arts, practised this branch not unsuccessfully; but not finding sufficient encouragement for his pastes of coloured glass, or perhaps from local difficulties in making them well and cheap, he abandoned this art. He substituted in its place impressions of fine white alabaster or selenite plaster. Such impressions, when carefully soaked in a solution of white Castile soap, then dried, and rubbed over with a soft brush, take a very agreeable polish. They show the work perhaps to better advantage than red or white sulphurs do; but they are not so durable, and are liable to be defaced by rubbing.

Of these impressions Mr Lippart published three different collections, each of them containing 1000 articles; and to the merit of having increased the number of Mademoiselle Feloix and Christiano Dehn's collections, which are all inserted in his, he added that of employing two learned Germans to arrange and describe them. The first thousand were arranged and described by the late professor Christ at Leipzig, and the second and third thousand by professor Heine.

(A) See M. de la Condamine's *Diff. in Memoir. de l'Acad. Roy. de Paris*, 1757.

(B) *Gemmæ antiquæ coloratæ, sculptorum nominibus insignitæ, re incisæ, per Bernardum Picart. Amstelodam. 1724, folio.*

Heine at Goettingen. Nor did Mr Lippart stop here: but to make the study of antiquity more easy and acceptable to artists, he selected out of the whole collection of 3000, a smaller one of 2000 of the best and most instructive subjects, of which he himself drew up and published a description in German.

But of all the artists and ingenious men who have taken impressions of engraved gems in sulphur and in paste, no one seems to have carried that art to such perfection as Mr James Tassie, a native of Glasgow but who has resided in London since the year 1766. His knowledge in various branches of the fine arts, particularly in that of drawing, naturally led him to it. The elegant portraits which he models in wax, and afterwards moulds and casts in paste, which entirely resemble cameos, are well known to the public.

Mr Tassie, profiting of all the former publications of this sort, and by expence, industry, and access to many cabinets in England and other kingdoms to which former artists had not obtained admission, has now increased his collection of impressions of ancient and modern gems to the number of above 15,000 articles. It is the greatest collection of this kind that ever existed; and serves for all the purposes of artists, antiquaries, scholars, men of taste, and even philosophers. The great demand for his pastes was perhaps owing in the beginning to the London jewellers, who introduced them into fashion by setting them in rings, seals, bracelets, necklaces, and other trinkets.

The reputation of this collection having reached the empress of Russia, she was pleased to order a complete set; which being accordingly executed in the best and most durable manner, were arranged in elegant cabinets, and are now placed in the noble apartments of her imperial majesty's superb palace at Czar'sk Zelo.

Mr Tassie, in executing this commission, availed himself of all the advantages which the improved state of chemistry, the various ornamental arts, and the knowledge of the age, seemed to afford. The impressions were taken in a beautiful white enamel composition, which is not subject to shrink or form air-bladders; which emits fire when struck with steel, and takes a fine polish; and which shows every stroke and touch of the artist in higher perfection than any other substance. When the colours, mixed colours, and nature of the respective originals, could be ascertained, they were imitated as completely as art can imitate them; inasmuch that many of the paste intaglios and cameos in this collection are such faithful imitations, that artists themselves have owned they could hardly be distinguished from the originals. And when the colour and nature of the gems could not be authenticated, the pastes were executed in agreeable, and chiefly transparent, colours; constant attention being bestowed to preserve the outlines, extremities, attributes, and inscriptions.

It was the learned Mr Raspe (from whom this account (c) is taken) who arranged this great collection, and made out the descriptive catalogue. His arrangement is nearly the same with that of the late Abbé Winkelmann, in his description of the gems which be-

longed to Baron Stofch. But as modern works were inserted in this collection, he found it necessary to make a few alterations, and added some divisions to those of M. Winkelmann, as will appear from the following conspectus, with which we shall conclude this detail.

I. Ancient Art and Engravings.

Egyptian. Hieroglyphics, sacred animals, divinities, priests.

Basilidian, Gnostic, and other talismans, &c.

Oriental and barbarous ancient and modern engravings.

Greek and Roman originals, copies, and imitations (the Etruscan are classed with the Greek works.)

A, Mythology or fabulous age. Gods, inferior divinities, religious ceremonies.

B, Heroic age before the siege of Troy.

C, Siege of Troy.

D, Historic age. Of Carthage, Greece, Rome, subjects unknown.

E, Fabulous animals and chimeras.

F, Vases and urns.

II. Modern Art and Engravings.

A, Religious subjects.

B, Portraits of kings and sovereigns.

C, Portraits of illustrious men in alphabetical order.

D, Portraits unknown.

E, Devices and emblems.

F, Cyphers, arms, supporters, and medley of modern history.

GEMARA, or GHEMARA, the second part of the TALMUD.

The word גמרה, *gemara*, is commonly supposed to denote a supplement; but in strictness it rather signifies complement, perfection: being formed of the Chaldee גמר, *gemar* or *ghemar*, "to finish, perfect, or complete any thing."

The rabbins call the Pentateuch simply the law: the first part of the Talmud, which is only an explication of that law, or an application thereof to particular cases, with the decisions of the ancient rabbins thereon, they call the *Mischna*, i. e. "second law:" and the second part, which is a more extensive and ample explication of the same law, and a collection of decisions of the rabbins posterior to the *Mischna*, they call *Gemara*, q. d. "perfection, completion, finishing;" because they esteem it the finishing of the law, or an explication beyond which there is nothing farther to be desired.

The *Gemara* is usually called simply *Talmud*, the common name of the whole work. In this sense we say, there are two *Gemaras* or *Talmuds*; that of Jerusalem and that of Babylon: though in strictness the *Gemara* is only an explication of the *Mischna*, given by the Jewish doctors in their schools; much as the commentaries of our school-divines on St Thomas, or the master of the sentences, are an explication of the writings of those authors.

A commentary, Mons. Tillemont observes, was wrote on the *Mischna*, by one Jochanan, whom the Jews place about the end of the second century: but Fa-

(c) Account of the present state and arrangement of Mr James Tassie's collection of pastes and impressions from ancient and modern gems, by R. C. Raspe, London, 1786, 8vo.

Gemini,
Geminiani

Morin proves, from the work itself, wherein mention is made of the Turks, that it was not wrote till the time of Heraclius, or about the year 620; and this is what is called the *Gemara*, or *Talmud of Jerusalem*, which the Jews do not use or esteem much because of its obscurity.

They set a much greater value on the *Gemara*, or *Talmud of Babylon*, begun by one Afa; discontinued for 73 years, on occasion of the wars with the Saracens and Persians; and finished by one Jofa, about the close of the seventh century. See *TALMUD*.

Though the name *Talmud*, in its latitude, includes both the *Mischna* and the two *Gemaras*, yet it is properly that of Afa and Jofa alone which is meant under that name. This the Jews prize above all their other writings, and even set it on a level with scripture itself: in effect, they conceive it as the word of God, derived by tradition from Moses, and preserved without interruption to their time. R. Jehuda, and afterwards R. Johanan, R. Afa, and R. Jofa, fearing the traditions should be lost in the dispersion of the Jews, collected them into the *Mischna* and the *Gemara*. See *CARAITES* and *RABBINISTS*.

GEMINI, in astronomy, the **TWINS**; a constellation or sign of the zodiac, the third in order, representing Castor and Pollux; and it is marked thus, ♊. The stars in the sign Gemini, in Ptolemy's catalogue, are 25; in Tycho's, 25; in Hevelius's, 38; in the *Britannic Catalogue*, 85.

GEMINIANI, a celebrated musician and composer, was born at Lucca in the year 1680. He received his first instructions in music from Alessandro Scarlatti; and after that became a pupil of Carlo Ambrosio Lunati, surnamed *Il Gobbo*, a most celebrated performer on the violin; after which he became a disciple of Corelli, and under him finished his studies on that instrument. In the year 1714, he came to England; where in a short time he so recommended himself by his exquisite performance, that all who professed to love and understand music were captivated with hearing him. Many of the nobility laid claim to the honour of being his patrons; but he seemed chiefly to attach himself to Baron Kilmansegge, chamberlain to king George I. as elector of Hanover, and a favourite of that prince. In 1716, he published and dedicated to his patron 12 sonatas *a violino violone e cembalo*: the first six with fugues and double stops as they are vulgarly called; the last with airs of various measures, such as allemandes, courants, and jiggs. This publication was so well relished by the baron, that he mentioned Geminiani to the king as an excellent performer; in consequence of which our musician had the honour to perform before his majesty, in concert with the celebrated Handel, who played on the harpsichord. But though Geminiani was exceedingly admired, yet he had not a talent at associating music with poetry, nor do we find that he ever became a public performer: he was therefore obliged to depend for his subsistence on the friendship of his patrons, and the profits which accrued to him from teaching. He had also the misfortune to be an enthusiast in painting; and the versatility of his temper was such, that, in order to gratify this passion, he not only suspended his studies, and neglected to exercise his talents, but involved himself in debts. In 1727, he was offered the place of

master and composer of the state-music in Ireland; but this could not be conferred on a Catholic, and Geminiani refused to change his religion: upon which it was given to Matthew Dubourg, a young man who had been one of his pupils, and was a celebrated performer on the violin. Geminiani then set himself to compose parts to the *opera quinta* of Corelli; or, in other words, to make concertos of the first six of his solos. This work he completed, and, with the help of a subscription, at the head of which were the names of the royal family, published in 1726. In 1732, he published his *opera seconda*, which contains a celebrated minuet that goes by his name. He published many other pieces, the profits of which did not much mend his circumstances; but this perhaps was owing to his rambling disposition and enthusiastic fondness of painting. He was also an utter stranger to the business of an orchestra, and had no idea of the labour and pains necessary in the instruction of fingers for the performance of music to which they were strangers. The consequence of this was, that a *concerto spirituale*, which he had advertised for his own benefit in 1748, failed in the performance. The audience, however, compassionated his distress, and sat very silent till the books were changed; when the performance was continued with compositions of the author's own, and which he executed in such a manner as was never forgot. The profits arising from this performance enabled him to take a journey to Paris; where he staid long enough to get plates engraven for a score of solos, and the parts of two operas of concertos. About the year 1755 he returned to England, and advertised them for sale. In 1761, Geminiani went over to Ireland; and was kindly entertained there by Mr Matthew Dubourg, who had been his pupil, and was then master of the king's band in Ireland. This person through the course of his life had ever been disposed to render him friendly offices; and it was but a short time after Geminiani's arrival at Dublin that he was called upon to do him the last. It seems that Geminiani had spent many years in compiling an elaborate treatise on music, which he intended for publication; but soon after his arrival at Dublin, by the treachery of a female servant, who, it was said, was recommended to him for no other end than that she might steal it, it was conveyed away, and could not be recovered. The greatness of this loss, and his inability to repair it, made a deep impression on his mind; and, as is conjectured, hastened his end; at least he survived it but a short time, ending his days on the 17th of September 1762. The following list comprises the whole of his publications, except two or three articles of small account. Twelve solos for a violin, *opera prima*; six concertos in seven parts, *opera seconda*; six concertos in seven parts, *opera terza*; twelve solos for a violin, *opera quarta*; six solos for a violoncello, *opera quinta*; the same made into solos for a violin; six concertos from his *opera quarta*; six concertos in eight parts, *opera sesta*; rules for playing in taste; a treatise on good taste; the art of playing the violin; 12 sonatas from his first solos, *opera undecima*; Ripieno parts to ditto; lessons for the harpsichord; *Guida Armonica*; supplement to ditto; the art of accompaniment, two books; his first two operas of concertos in score; and the enchanted forest.—Of his solos the *opera prima* is esteem-

Gemma ed the best. Of his concertos some are excellent, others of them scarce pass the bounds of mediocrity. The sixth of the third opera not only surpasses all the rest, but, in the opinion of the best judges of harmony, is the finest instrumental composition extant.

GEMMA, or BUD, in botany; a compendium or epitome of a plant, seated upon the stem and branches, and covered with scales, in order to defend the tender rudiments inclosed from cold and other external injuries, till, their parts being unfolded, they acquire strength, and render any further protection unnecessary.

Buds, together with bulbs, which are a species of buds generally seated upon or near the root, constitute that part of the herb called by Linnæus *hybernacula*; that is, the winter-quarters of the future vegetable: a very proper appellation, as it is during that severe season that the tender rudiments are protected in the manner just mentioned.

Plants, considered in analogy to animals, may properly enough be reckoned both viviparous and oviparous. Seeds are the vegetable eggs; buds, living fetuses, or infant-plants, which renew the species as certainly as the seed.

Buds are placed at the extremity of the young shoots, and along the branches, being fixed by a short footstalk upon a kind of brackets, the remainder of the leaves, in the wings or angles of which the buds in question were formed the preceding year. They are sometimes placed single; sometimes two by two, and those either opposite or alternate; sometimes collected in greater numbers in whirls or rings.

With respect to their construction, buds are composed of several parts artificially arranged. Externally, we find a number of scales that are pretty hard, frequently armed with hairs, hollowed like a spoon, and placed over each other like tiles. These scales are fixed into the inner plates of the bark, of which they appear to be a prolongation. Their use is to defend the internal parts of the bud; which, being unfolded, will produce, some, flowers, leaves, and stipulæ; others, footstalks and scales. All these parts, while they remain in the bud, are tender, delicate, folded over each other, and covered with a thick clammy juice, which is sometimes resinous and odoriferous, as in the tacamac-tree. This juice serves not only to defend the more tender parts of the embryo-plant from cold, the assaults of insects, and other external injuries; but likewise from excessive perspiration, which, in its young and infant state, would be very destructive. It is conspicuous in the buds of horse-chestnut, poplar, and willow trees.

In general, we may distinguish three kinds of buds; that containing the flower, that containing the leaves, and that containing both flower and leaves.

The first, termed *gemma florifera*, and by the French *bouton a fleur* or *a fruit*, contains the rudiments of one or several flowers, folded over each other, and surrounded with scales. In several trees, this kind of bud is commonly found at the extremity of certain small branches, which are shorter, rougher, and less garnished with leaves, than the rest. The external scales of this species of bud are harder than the internal; both are furnished with hairs, and in general more swelled than those of the second sort. The bud containing the flower too is commonly thicker, shorter, al-

Gemma. most square, less uniform, and less pointed; being generally terminated obtusely. It is called by Pliny *oculus gemma*; and is employed in that species of grafting called *inoculation*, or *budding*.

The second species of bud, viz. that containing the leaves, termed *gemma folifera*, and by the French *bouton a feuilles* or *a bois*, contains the rudiments of several leaves, which are variously folded over each other, and outwardly surrounded by scales, from which the small stipulæ that are seated at the foot of the young branches are chiefly produced. These buds are commonly more pointed than the former sort. In the hazel-nut, however, they are perfectly round; and in horse-chestnut, very thick.

The third sort of bud is smaller than either of the preceding; and produces both flowers and leaves, tho' not always in the same manner. Sometimes the flowers and leaves are unfolded at the same time. This mode of the flower and leaf bud is termed by Linnæus *gemma folifera & florifera*. Sometimes the leaves proceed or emerge out of this kind of bud upon a small branch, which afterwards produces flowers. This mode of the flower and leaf bud is termed by Linnæus *gemma folifera florifera*, and is the most common bud of any.

Such buds as produce branches adorned only with leaves, are called *barren*; such as contain both leaves and flowers, *fertile*. From the bulk of the bud we may often with ease foretell whether it contains leaves only, or leaves and flowers together, as in cherry and pear trees.

Neither the buds produced on or near the root, called by some authors *turiones*, nor those produced on the trunk, and from the angles or wings of the leaves, contain, in strict propriety, an entire delineation of the plant; since the roots are wanting; and in various buds, as we have seen, shoots are contained with leaves only, and not with flowers: but as a branch may be considered as a part similar to the whole plant, and, if planted, would in process of revegetation exhibit or produce roots and flowers, we may in general allow, that the bud contains the whole plant, or the principles of the whole plant, which may be unfolded *ad libitum*; and thus resembles the seed in containing a delineation of the future plant in embryo: for although the bud wants a radicle, or plumula, of which the seed is possessed, yet it would undoubtedly form one, if planted in the earth. But as the medullary part adhering to the bud is too tender, and by the abundance of juice flowing into it from the earth would be disposed to putrefaction, the buds are not planted in the soil, but generally inserted within the bark of another tree; yet placed so that the production of the marrow, or pith, adhering to them, may be inserted into the pith of the branch in which the fissure or cleft is made; by which means there is a large communication of juice. This propagation by gems or buds, called *inoculation*, is commonly practised with the first sort of buds above described.

From the obvious uses of the buds, we may collect the reason why the supreme Author of nature has granted this sort of protection to most of the trees that are natives of cold climates: and, on the other hand, denied it to such as, enjoying a warm benign atmosphere, have not the tender parts of their embryo-

shoots.

Gemma, shoots exposed to injuries and depredations from the severities of the weather. Of this latter kind are the plants of the following list; some of them very large trees; others smaller woody vegetables, of the shrub and under-shrub kind: Citron, orange, lemon, cassava, mock-orange, blad-apple, shrubby swallow-wort, alaternus, shrubby geraniums, berry-bearing alder, Christ's-thorn. Syrian mallow, baobab or Ethiopian four-gourd, justicia, mild fena, the acacias and sensitive plant, coral-tree, stinking bean-trefoil, medicago, oleander, viburnum, sumach, ivy, tamarisk, heath, Barbadoes cherry, lavatera, rue, shrubby nightshades, Guinea henweed, cypress, lignum vitæ, and savine a species of juniper.

On annual plants, whose root as well as stalk perishes after a year; true buds are never produced; in their stead, however, are protruded small branches, like a little feather, from the wings of the leaves, which wither without any farther expansion if the plants climb and have no lateral branches; but if, either by their own nature or from abundance of sap, the plants become branched, the ramuli just mentioned obtain an increase similar to that of the whole plant.

The same appearance obtains in the trees of warm countries, such as those enumerated in the above list, in which a plumula, or small feather, sends forth branches without a scaly covering; as, in such countries, this tender part requires no defence or protection from cold. A scaly covering then is peculiar to buds, as it protects the tender embryo inclosed from all external injuries. When we therefore speak of trees having buds that are naked or without scales, our meaning is the same as if we had said that they have no buds at all.

The buds that are to be unfolded the following year, break forth from the evolved buds of the present year, in such a manner as to put on the appearance of small eminences in the wings or angles of the leaves. These eminences or knots grow but little during the summer; as, in that season, the sap is expended on the increase of the parts of the plant: but in autumn, when the leaves begin to wither and fall off, the buds, placed on the wings, increase; and the embryo-plant contained in the bud is so expanded, that the leaves and flowers, the parts to be evolved the following year, are distinctly visible. Thus in horse-chestnut the leaves, and in cornel-tree the flowers, are each to be observed in their respective buds.

As each bud contains the rudiments of a plant, and would, if separated from its parent vegetable, become every way similar to it; Linnæus, to show the wonderful fertility of nature, has made a calculation, by which it appears, that, in a trunk scarce exceeding a span in breadth, 10,000 buds (that is, herbs) may be produced. What an infinite number, then, of plants might be raised from a very large tree!

GEMMATIO, from *gemma*, "a bud;" a term used by Linnæus, expressive of the form of the buds, their origin, and their contents. It includes both those properly called *buds*, and those which are seated at the roots, styled *bulbs*.

As to the origin of buds, they are formed either of the footstalks of the leaves, of stipulæ, or of scales of the bark. Their contents have been already discovered, in the preceding article, to be either flowers, leaves, or both.

GEMONIÆ SCALÆ, or *Gradus GEMONIÆ*, among the Romans, was much the same as gallows or gibbet in England.—Some say they were thus denominated from the person who raised them; others, from the first criminals that suffered on them; and others, from the verb *gemo*, "I sigh or groan."

The *gradus gemoniæ*, according to Publius Victor or Sextus Rufus, was a place raised on several steps, from whence they precipitated their criminals; others represent it as a place whereon offenders were executed, and afterwards exposed to public view. The *gemoniæ scale* were in the tenth region of the city, near the temple of Juno. Camillus first appropriated the place to this use, in the year of Rome 358.

GENDARMES, or GEN D'ARMES, in the French armies, a denomination given to a select body of horse; on account of their succeeding the ancient gendarmes, who were thus called from their being completely clothed in armour; (see *Scots GENDARMES*, *infra*.) These troops were commanded by captain-lieutenants, the king and the princes of the blood being their captains: the king's troop, besides a captain-lieutenant, has two sublieutenants, three ensigns, and three guidons.

Grand GENDARMES, latterly were a troop composed of 250 gentlemen; the king himself was their captain, and one of the first peers their captain-lieutenant, who has under him two lieutenants, three ensigns, three guidons, and other officers.

Small GENDARMES, were the Scots gendarmes, the queen's, the dauphin's, the gendarmes of Anjou, Burgundy, the English and Flemish gendarmes, having each a captain-lieutenant, sub-lieutenant, ensign, guidon, and quarter-master.

Scots GENDARMES, were originally instituted by Charles VII. of France, about the middle of the 5th century, and formed a part of his guard; in which station also they acted under other princes. It was their prerogative to take precedence of all the companies of the gendarmerie of France; and, on particular occasions, they even preceded the two companies of the king's mousquetaires. The sons of the Scottish monarchs were the usual captains of this company; and, after Mary's accession to the throne, its command belonged to them as a right. It was thence that James VI. made a claim of it for his son prince Henry. This honour, and its emoluments, were also enjoyed by Charles I. and the next in command to this prince was Louis Stuart duke of Lennox. George Gordon marquis of Huntly succeeded the duke of Lennox in the year 1624, and took the title of captain or commander in chief when Charles I. mounted the English throne. It is not certain whether Charles II. was ever captain of this company; but it was conferred on his brother the duke of York, who was captain of the Scots gendarmes till the year 1667, when he resigned his commission into the hands of the French king. Since that time no native of Great Britain has enjoyed this command. See *Scots GUARDS*.

All the different gendarmeries are now abolished, in consequence of the reforming systems that have lately taken place in France.

GENDER, among grammarians, a division of nouns, or names, to distinguish the two sexes.

This was the original intention of gender: but afterwards

Gemoniæ
||
Gender.

Stuart's
Constit. of
Scotland.

Gendre
||
Genep.

wards other words, which had no proper relation either to the one sex or the other, had genders assigned them, rather out of caprice than reason; which is at length established by custom. Hence genders vary according to the languages, or even according to the words introduced from one language into another. Thus, *arbor* in Latin is feminine, but *arbre* in French is masculine; and *dens* in Latin is masculine, but *dent* in French is feminine.

The oriental languages frequently neglect the use of genders, and the Persian language has none at all.

The Latins, Greeks, &c. generally content themselves to express the different genders by different terminations; as *bonus equus*, "a good horse;" *bona equa*, "a good mare," &c. But in English we frequently go further, and express the difference of sex by different words: as boar, sow; boy, girl; buck, doe; bull, cow; cock, hen; dog, bitch, &c.—We have only about 24 feminines, distinguished from the males, by the variation of the termination of the male into *es*; of which number are abbot, abbess; count, countess; actor, actress; heir, heiress; prince, princess, &c. which is all that our language knows of any thing like genders.

The Greek and Latin, besides the masculine and feminine, have the neuter, common, and the doubtful gender; and likewise the epicene, or promiscuous, which under one single gender and termination includes both the kinds.

GENDRE (Louis le), an esteemed historian, born at Roan. He became canon of Notre Dame at Paris, subchanter of the same church, and abbot of Notre Dame at Claire Fontaine in the diocese of Chartres. He wrote a great number of works; the principal of which are: 1. The Manners and Customs of the French, in the different times of that monarchy. 2. An History of France, in three volumes folio, and in seven volumes duodecimo. 3. The Life of Cardinal d'Amboise. He died in 1733, aged 78.

GENDRE (Gilbert Charles le), marquis of St Aubin, counsellor in the parliament of Paris, and afterwards master of requests in the king's household. He wrote several works; but is chiefly distinguished by his *Traité de l'opinion*, 9 vols 12mo; a curious performance, proving, by historic examples, the empire of opinion over the works of art and science. He died at Paris in 1746, aged 59.

GENEALOGY, an enumeration of a series of ancestors; or a summary account of the relations and alliances of a person or family, both in the direct and collateral line.

The word is Greek, γενεαλογια; which is formed of γενεα, "race or lineage," and λογος, "discourse."

In divers chapters and military orders, it is required that the candidates produce their genealogy, to show that they are noble by so many descents.

GENEALOGICA ARBOR, or *Tree of Consanguinity*, signifies a genealogy or lineage drawn out under the figure of a tree, with its root, flock, branches, &c. The genealogical degrees are usually represented in circles, ranged over, under, and aside each other. This the Greeks called *stemma*, a word signifying crown, garland, or the like. See the articles **CONSANGUINITY** and **DESCENT**, and the plates there referred to.

GENEP, a strong town of Germany, in the circle of

Westphalia, subject to the king of Prussia. E. Long.

4. 29. N. Lat. 51. 42.

GENERAL, an appellation given to whatever belongs to a whole genus.

GENERAL Assembly. See **ASSEMBLY**.

GENERAL Charge, in law. See *CHARGE to enter Heir*.

GENERAL Terms, among logicians, those which are made the signs of general ideas. See **LOGIC** and **METAPHYSICS**.

GENERAL Warrant. See **WARRANT**.

GENERAL of an Army, in the art of WAR, he who commands in chief. See the article **WAR**, where his office and duties are particularly explained.

GENERAL of the Artillery. See **ORDNANCE**.

GENERAL of Horse, and *GENERAL of Foot*, are posts next under the general of the army, and these have upon all occasions an absolute authority over all the horse and foot in the army.

Adjutant-GENERAL, one who attends the general, assists in council, and carries the general's orders to the army. He distributes the daily orders to the majors of brigade. He is likewise charged with the general detail of the duty of the army. The majors of brigade send every morning to the adjutant-general an exact return, by battalion and company, of the men of his brigade. In a day of battle the adjutant-general sees the infantry drawn up; after which, he places himself by the general, to receive any orders which may regard the corps of which he has the detail. In a siege, he orders the number of workmen demanded, and signs the warrant for their payment. He receives the guards of the trenches at their rendezvous, and examines their condition; he gives and signs all orders for parties. He has an orderly sergeant from each brigade of infantry in the line, to carry such orders as he may have occasion to send from the general.

Lieutenant-GENERAL, is the next in command after the general; and provided he should die or be killed, the order is, that the oldest lieutenant-general shall take the command. This office is the first military dignity after that of a general. One part of their function is, to assist the general with their counsel: they ought therefore, if possible, to possess the same qualities with the general himself; and the more, as they often command armies in chief.

The number of lieutenant-generals have been multiplied of late in Europe, in proportion as the armies have become numerous. They serve either in the field, or in sieges, according to the dates of their commissions. In battle, the oldest commands the right wing of the army, the second the left wing, the third the centre; the fourth the right wing of the second line, the fifth the left wing, the sixth the centre; and so on. In sieges, the lieutenant-generals always command the right of the principal attack, and order what they judge proper for the advancement of the siege during the 24 hours they are in the trenches; except the attacks, which they are not to make without an order from the general in chief.

Lieutenant-GENERAL of the Ordnance. See **ORDNANCE**.

Lieutenant-GENERAL of Artillery, is, or ought to be, a very great mathematician, and an able engineer; to know all the powers of artillery; to understand the attack and defence of fortified places, in all its different

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General.

General
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rent branches; how to dispose of the artillery in the day of battle to the best advantage; to conduct its march and retreat; as also to be well acquainted with all the numerous apparatus belonging to the train, and to the laboratory, &c.

Major-GENERAL, the next officer to the lieutenant-general. His chief business is to receive orders from the general, or in his absence from the lieutenant-general of the day; which he is to distribute to the brigade-majors, with whom he is to regulate the guards, convoys, detachments, &c. On him the whole fatigue and detail of duty of the army roll. It is the major-general of the day who is charged with the encampment of the army, who places himself at the head of it when they march, who marks out the ground of the camp to the quarter-master-general, and who places the new guards for the safety of the camp.

The day the army is to march, he dictates to the field-officers the order of the march, which he has received from the general, and on other days gives them the parole.

In a fixed camp he is charged with the foraging, with reconnoitring the ground for it, and posting the escorts, &c.

In sieges, if there are two separate attacks, the second belongs to him; but if there is but one, he takes, either from the right or left of the attack, that which the lieutenant-general has not chosen.

When the army is under arms, he assists the lieutenant-general, whose orders he executes.

If the army marches to an engagement, his post is at the head of the guards of the army, until they are near enough to the enemy to rejoin their different corps; after which he retires to his own proper post: for the major-generals are disposed on the order of battle as the lieutenant-generals are; to whom, however, they are subordinate, for the command of their divisions. The major-general has one aid-de-camp, paid for executing his orders.

GENERAL is also used for a particular march, or beat of drum; being the first which gives notice, commonly in the morning early, for the infantry to be in readiness to march.

GENERAL is likewise an appellation by which officers in law, in the revenues, &c. are distinguished; as, *attorney-general*, *solicitor-general*, &c. *receiver-general*, *comptroller-general*, &c. See ATTORNEY, &c.

GENERAL is also used for the chief of an order of monks; or of all the houses and congregations established under the same rule. Thus we say, the general of the Franciscans, Cistercians, &c.

GENERALISSIMO, called also *captain-general*, and simply *general*, is an officer who commands all the military powers of a nation; who gives orders to all the other general officers; and receives no orders himself but from the king.

Mons. Balzac observes, that the cardinal de Richelieu first coined this word, of his own absolute authority, upon his going to command the French army in Italy.

GENERATE, in music, is used to signify the operation of that mechanical power in nature, which every sound has in producing one or more different sounds. Thus any given sound, however simple, produces along with itself, its octave, and two other sounds extremely sharp, viz. its twelfth above, that is

N^o 136.

to say, the octave of its fifth; and the other the seventeenth above, or, in other words, the double octave of its third major.

Whether we suppose this procreation of sounds to result from an aptitude in the texture and magnitude of certain particles in the air, for conveying to our ears vibrations that bear those proportions one to another, as being determined at once by the partial and total oscillations of any musical string; or from whatever economy of nature we choose to trace it; the power of one sound thus to produce another, when in action, is said to *generate*. The same word is applied, by Signior Tartini and his followers, to any two sounds which, simultaneously heard, produce a third.

GENERATED, or GENITED, is used, by some mathematical writers, for whatever is produced, either in arithmetic, by the multiplication, division, or extraction of roots; or in geometry, by the invention of the contents, areas, and sides; or of extreme and mean proportionals, without arithmetical addition and subtraction.

GENERATING LINE, or FIGURE, in geometry, is that which, by its motion of revolution, produces any other figure, plane or solid. See GENESIS.

GENERATION, in physiology, the act of procreating and producing a being similar to the parent. See ANATOMY, n^o 109, 110.

GENERATION of *Fishes*. See COMPARATIVE ANATOMY, n^o 154. and ICHTHYOLOGY.

GENERATION of *Plants*. See BOTANY, sect. v.

GENERATION of *Insects*. See COMPARATIVE ANATOMY, p. 274. and ENTOMOLOGY, sect. ii.

Parts of GENERATION. See ANATOMY, n^o 107, 108.

GENERATION, in mathematics, is used for formation or production. Thus we meet with the generation of equations, curves, solids, &c.

GENERATION, in theology. The Father is said by some divines to have produced his Word or Son from all eternity, by way of generation; on which occasion the word *generation* raises a peculiar idea: that procession, which is really effected in the way of understanding, is called *generation*, because in virtue thereof, the Word becomes like to him from whom he takes this original; or, as St Paul expresses it, is the figure or image of his substance, *i. e.* of his being and nature. And hence it is, they say, that the second Person in the Trinity is called the Son.

GENERATION is also used, though somewhat improperly, for genealogy, or the series of children issued from the same stock. Thus the gospel of St Matthew commences with the book of the generation of Jesus Christ, &c. The latter and more accurate translators, instead of *generation* use the word *genealogy*.

GENERATION is also used to signify a people, race, or nation, especially in the literal translations of the scripture, where the word generally occurs wherever the Latin has *generatio*, and the Greek γενεα. Thus, "A wicked and perverse generation seeketh a sign," &c. "One generation passes away, and another cometh," &c.

GENERATION is also used in the sense of an age, or the ordinary period of man's life. Thus we say, "to the third and fourth generation." In this sense historians usually reckon a generation the space of 33 years or thereabouts. See AGE.

Herodotus

Generate
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Generation.

generator Herodotus makes three generations in an hundred years; which computation appears from the later authors of political arithmetic to be pretty just.

GENERATOR, in music, signifies the principal sound or sounds by which others are produced. Thus the lowest C for the treble of the harpsicord, besides its octave, will strike an attentive ear with its twelfth above, or G in alt, and with its seventeenth above, or E in alt. The C, therefore, is called their *generator*, the G and E its products or harmonics. But in the approximation of chords, for G, its octave below is substituted, which constitutes a fifth from the generator, or lowest C; and for E, is likewise substituted its fifteenth below, which, with the above mentioned C, forms a third major. To the lowest notes, therefore, exchanged for these in alt by substitution, the denominations of products or harmonics are likewise given, whilst the C retains the name of their *generator*. But still according to the system of Tartini, two notes in concord, which when sounded produce a third, may be termed the *concurring generators* of that third. (See *Generation Harmonique, par M. Rameau*; see also that delineation of Tartini's system called *The power and principles of harmony*.)

GENERAL NAME, in natural history, the word used to signify all the species of natural bodies, which agree in certain essential and peculiar characters, and therefore all of the same family or kind; so that the word used as the general name equally expresses every one of them, and some other words expressive of the peculiar qualities or figures of each are added, in order to denote them singly, and make up what is called the specific name. See **BOTANY** and **ZOOLOGY**.

GENESIS, the first book of the Old Testament, containing the history of the creation, and the lives of the first patriarchs.

The book of Genesis stands at the head of the Pentateuch. Its author is held to be Moses: it contains the relation of 2369 years, viz. from the beginning of the world to the death of Joseph. The Jews are forbidden to read the beginning of Genesis, and the beginning of Ezekiel, before 30 years of age.

The Hebrews called this book *Bereſchith*, because it begins with that word, which in their language signifies *in principio*, or "in the beginning." The Greeks gave it the name *Genesis*, *Γενεσις*, *q. d.* production, generation, because it begins with the history of the production or generation of all beings.

This book, besides the history of the creation, contains an account of the original innocence and fall of man; the propagation of mankind; the rise of religion; the general defection and corruption of the world; the deluge; the restoration of the world; the division and peopling of the earth; and the history of the first patriarchs to the death of Joseph. It was easy for Moses to be satisfied of the truth of what he delivers in this book, because it came down to him thro' a few hands: for from Adam to Noah there was one man, viz. Methuselah, who lived so long as to see them both: in like manner Shem conversed with Noah and Abraham; Isaac with Abraham and Joseph, from whom the records of this book might easily be conveyed to Moses by Amram, who was contemporary with Joseph.

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GENESIS, in geometry, denotes the formation of a line, plane, or solid, by the motion or flux of a point, line, or surface. See **FLUXIONS**.

The *genesis* or formation, *q. gr.* of a globe or sphere, is conceived by supposing a semicircle to revolve upon a right line, drawn from one extreme thereof to the other, called its axis; or axis of circumvolution: the motion or revolution of that semicircle is the *genesis* of the sphere, &c.

In the *genesis* of figures, &c. the line or surface that moves is called the *describent*; and the line round which, or, according to which, the revolution or motion is made, the *dirigent*.

GENET, **GENNET**, or *Jennet*, in the manege, denotes a small-sized well-proportioned Spanish horse.

To ride *a la genet*, is to ride after the Spanish fashion, so short, that the spurs bear upon the horse's flank.

GENETHLIA, in antiquity, a solemnity kept in memory of some person deceased.

GENETHLIACI, in astrology, persons who erect horoscopes or pretend to foretel what shall befall a man by means of the stars which presided at his nativity. The word is formed of the Greek *γενεθλιον*, origin, generation, nativity.

The ancients called them *Chaldei*, and by the general name *mathematici*: accordingly, the several civil and canon laws, which we find made against the mathematicians, only respect the *genethliaci* or astrologers.

They were expelled Rome by a formal decree of the senate; and yet found so much protection from the credulity of the people, that they remained therein unmolested. Hence an ancient author speaks of them as *hominum genus, quod in civitate nostra semper & vetabitur, & retinebitur*.

GENETTE, in zoology. See **VIVERRA**.

GENEVA, a city of Switzerland, on the confines of France and Savoy, situated in 6° E. Long. and 46° 12' 9" N. Lat. It stands on the banks of the river Rhone, just at the place where the latter issues from the lake which takes its name from the city; and part of it is built on an island in the river. It is handsome, well fortified, and pretty large; the streets in general are clean and well paved, but the principal one is encumbered with a row of shops on each side between the carriage and foot-paths. The latter is very wide, and protected from the weather by great wooden pent-houses projecting from the roofs; which, though very convenient, give the street a dark and dull appearance. The houses are generally constructed of freestone, with basements of limestone; the gutters, spouts, ridges, and outward ornaments, being made of tinned iron. Some of them have arched walks or piazzas in front. The place called *Treille* is very agreeable, being planted with linden trees, and commanding a fine prospect of the lake, with several ranges of rocks rising behind one another, some covered with vineyards and herbage, and others with snow, having openings between them. Immediately below Geneva the Rhone is joined by the Arve, a cold and muddy stream rising among the Alps, and deriving a considerable part of its waters from the Glaciers. The Rhone is quite clear and transparent, so that the muddy water of the Arve is distinguishable from it even after they have flowed for several miles together. There are four bridges

Genesis
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Geneva.

Geneva. over the Rhone before it joins the Arve; and from it the city is supplied with water by means of an hydraulic machine, which raises it 100 Paris feet above its level. The principal buildings are, 1. The Maison de Ville, or town-house, a plain ancient edifice, with large rooms, in which the councils assemble, and public entertainments are held; and in one of them a weekly concert is held by subscription during the winter. The ascent to the upper story is not by steps but a paved acclivity; which, however, is so gentle, that horses and mules can go up to the top. 2. The church of St Peter's, formerly the cathedral, is an ancient Gothic building, with a modern portico of seven large Corinthian columns of red and white marble from Roche. The only thing remarkable in the inside is the tomb of Henry duke of Rohan. 3. The arsenal is in good order, and supplied with arms sufficient for 12,000 men. There are many ancient suits of armour; and the scaling ladders, lanthorns, hatchets, &c. used by the Savoyards in their treacherous attempt on the city in the year 1602, to be afterwards noticed, are here preserved. The magazines contain 110 cannons besides mortars. 4. The hospital is a large handsome building, by which and other charities near 4000 poor people are maintained. 5. The fortifications on the side of Savoy are of the modern construction, but are commanded by some neighbouring grounds. On the side of France they are old-fashioned, and at any rate are rather calculated to prevent a surprise than to sustain a regular siege. There are three gates, towards France, Savoy, and Switzerland; and the access to the lake is guarded by a double jetty and chain.

The territory belonging to this city contains about seven square leagues, and is divided into nine parishes; the town is by far the most populous in Switzerland, having about 30,000 inhabitants, of whom, however, 5000 are generally supposed to be absent. It has a small district dependent upon it, but this does not contain above 16,000. The adjacent country is extremely beautiful, and has many magnificent views arising from the different positions of the numerous hills and mountains with regard to the town and lake. The inhabitants were formerly distinguished into four classes, viz. citizens, burghesses, inhabitants, and natives; and since the revolution in 1782, a fifth class, named *domicilius*, have been added, who annually receive permission from the magistrates to reside in the city. The citizens and burghesses alone, however, are admitted to a share in the government; those called *inhabitants* are strangers allowed to settle in the town with certain privileges; and the *natives* are the sons of those inhabitants, who possess additional advantages. The people are very active and industrious, carrying on an extensive commerce.

I
State of
learning in
Geneva.

This city is remarkable for the number of learned men it has produced. The reformed doctrines of religion were very early received in it, being preached there in 1533 by William Farel and Peter Viret of Orbe, and afterwards finally established by the celebrated John Calvin. Of this reformer Voltaire observes, that he gave his name to the religious doctrines first broached by others, in the same manner that Americus Vesputius gave name to the continent of America which had formerly been discovered by Columbus. It was by the assiduity of this celebrated reformer, and

the influence that he acquired among the citizens, that a public academy was first established in the city, where he, Theodore Beza, and some of the more eminent first reformers, read lectures with uncommon success. The intolerant spirit of Calvin is well known; but little of it now appears in the government of Geneva: on the contrary, it is the most tolerating of all the states in Switzerland, being the only one of them which permits the public exercise of the Lutheran religion. The advantages of the academy at Geneva are very conspicuous among the citizens at this day, even the lower class of them being exceedingly well informed; so that, according to Mr Coxe, there is not a city in Europe where learning is so generally diffused. "I received great satisfaction (says he) in conversing even with several tradesmen upon topics both of literature and politics; and was astonished to find in this class of men so uncommon a share of knowledge; but the wonder ceases when we are told that all of them were educated at the public academy." In this seminary the industry and emulation of the students are excited by the annual distribution of prizes to those who distinguish themselves in each class. The prizes consist of small medals, but are conferred with such solemnity as cannot fail to produce a striking effect on the minds of youth. There is also a public library to which the citizens have access, and which undoubtedly tends greatly to that universal diffusion of learning so remarkable among the inhabitants. It was founded by Bonnivard, remarkable for his sufferings in the cause of the liberties of his country. Having been a great antagonist of the dukes of Savoy, against whom he asserted the independence of Geneva, he had the misfortune at last to be taken prisoner, and was imprisoned for six years in a dungeon below the level of the lake, in the castle of Chillon, which stands on a rock in the lake, and is connected with the land by a draw-bridge. In 1536 this castle was taken from Charles III. of Savoy by the canton of Berne, assisted by the Genevans, who furnished a frigate (their whole naval force) to besiege it by sea. Bonnivard was now taken from his dungeon, where by constant walking backward and forward, his only amusement, he had worn a hollow in the floor which consisted of solid rock. Bonnivard considered the hardships he had endured as ties which endeared him to the city, and became a principal promoter of the reformation by the mild methods of persuasion and instruction. He closed his benefactions by the gift of his books and manuscripts, and bequeathing his fortune towards the establishment and support of the seminary. His works, which chiefly relate to the history of Geneva, are still preserved with great care and reverence. The library contains 25,000 volumes, with many curious manuscripts, of which an account has been published by the reverend M. Sennebier the librarian, who has likewise distinguished himself by several literary works. Messrs Bonnet, Saussure, Mallet, and de Luc, are the other most distinguished literary geniuses of which Geneva can boast. The last is particularly remarkable for the perfection to which he has brought the barometer, and which is now so great, that very little seems possible to be done by any body else. His cabinet merits the attention of naturalists, as containing many rare and curious specimens of fossils, which serve to illustrate the theory of the globe.

Geneva.

2
Account
de Luc's
cabinet.

It

Geneva. It may be divided into three parts: 1. Such as enable the naturalist to compare the petrifications of animals and vegetables with the same bodies which are still known to exist in our parts of the globe. 2. To compare these petrifications of animals with the same bodies which are known to exist in different countries. 3. To consider the petrifications of those bodies which are no longer known to exist. The second part comprehends the stones under three points of view: 1. Those of the primitive mountains, which contain no animal bodies; 2. Those of the secondary mountains, which contain only marine bodies; 3. Those which contain terrestrial bodies. The third part contains the lavas and other volcanic productions; which are distinguished into two classes: 1. Those which come from volcanoes now actually burning; 2. Those from extinguished volcanoes.

3 History and government of Geneva. In the time of Charles the Great, the city and territory of Geneva made part of his empire; and, under his successors, it became subject to the German emperors. By reason of the imbecility of these princes, however, the bishops of Geneva acquired such authority over the inhabitants, that the emperor had no other means of counterbalancing it than by augmenting the privileges of the people. In these barbarous ages also the bishops and counts had constant disputes, of which the people took the advantage; and by siding sometimes with one, and sometimes with the other, they obtained an extension of their privileges from both. The house of Savoy at length purchased the territory, and succeeded the counts with additional power: against them therefore the bishops and people united in order to resist their encroachments; and, during this period, the government was strangely complicated by reason of the various pretensions of the three parties. The counts of Savoy, however, had at last the address to dissolve the union between the bishops and citizens, by procuring the episcopal fee for their brothers, and even their illegitimate children; by which means their power became gradually so extensive, that towards the commencement of the 16th century, Charles III. of Savoy (though the government was accounted entirely republican) obtained an almost absolute authority over the people, and exercised it in a most unjust and arbitrary manner. Thus violent commotions took place; and the citizens became divided into two parties, one of which, viz. the patriots, were styled *Eidgenossen* or *confederates*; the partisans of Savoy being disgraced by the appellation of *Mammelucs* or *slaves*. The true period of Genevan liberty may therefore be considered as commencing with the treaty concluded with Berne and Friburg in the year 1526; in consequence of which the duke was in a short time deprived of his authority, the bishop driven from the city, and the reformed religion and a republican form of government introduced. A long war commenced with Savoy on this account; but the Genevans proved an overmatch for their enemies by their own bravery and the assistance of the inhabitants of Berne. In 1584, the republic concluded a treaty with Zurich and Berne, by which it is allied to the Swiss cantons. The house of Savoy made their last attempt against Geneva in 1602, when the city was treacherously attacked in the night-time during a profound peace. Two hundred soldiers had scaled the walls, and got into the town before any alarm was given;

but they were repulsed by the desperate valour of a few citizens, who perished in the encounter. A petard had been fastened to one of the gates by the Savoyards; but the gunner was killed before it could be discharged. The war occasioned by this treachery was next year concluded by a solemn treaty, which has ever since been observed on both sides; though the independence of Geneva was not formally acknowledged by the king of Sardinia till the year 1754.

The restoration of tranquillity from without in consequence of the above treaty, was however soon followed by the flames of internal discord, so common in popular governments; so that during the whole of the last century the history of Geneva affords little more than an account of the struggles betwixt the aristocratical and popular parties. About the beginning of the present century the power of the Grand Council was become almost absolute; but in order to restrain its authority, an edict was procured in 1707 by the popular party, enacting, that every five years a general council of the citizens and burghers should be summoned to deliberate upon the affairs of the republic. In consequence of this law a general assembly was convened in 1712; and the very first act of that assembly was to abolish the edict by which they had been convened. A proceeding so extraordinary can scarcely be accounted for on the principles of popular fickleness and inconstancy. Rousseau, in his Miscellaneous Works, ascribes it to the artifices of the magistrates, and the equivocal terms marked upon the billets then in use. For the question being put, "Whether the opinion of the councils for abolishing the periodical assemblies should pass into a law?" the words *approbation* or *rejection*, put upon the billets by which the votes were given, might be interpreted either way. Thus, if the billet was chosen on which the word *approbation* was written, the opinion of the councils which rejected the assemblies was approved; and by the word *rejection*, the periodical assembly was rejected of course. Hence several of the citizens complained that they had been deceived, and that they never meant to reject the general assembly, but only the opinion of the councils.

In consequence of the abolition of the general assemblies the power of the aristocratical party was greatly augmented; till at length the inhabitants exerting themselves with uncommon spirit and perseverance, found means to limit the power of the magistrates, and enlarge their own rights. In 1776, as Mr Cox informs us, the government might be considered as a mean betwixt that of the aristocratical and popular cantons of Switzerland. The members of the senate, or little council of 25, enjoyed in their corporate capacity several very considerable prerogatives. By them half the members of the great council were named; the principal magistrates were supplied from their own body; they convoked the great and general councils, deliberating previously upon every question which was to be brought before these councils. They were vested also with the chief executive power, the administration of finances, and had in a certain degree the jurisdiction in civil and criminal causes. Most of the smaller posts were likewise filled by them; and they enjoyed the sole privilege of conferring the burghership. These, and other prerogatives, however, were balanced by those of the great council and the privileges of the general

Geneva.

4 Sketch of the government in 1776.

Geneva.

neral council. The former had a right to choose the members of the senate from their own body; receiving appeals in all causes above a certain value, pardoning criminals, &c. besides which they had the important privilege of approving or rejecting whatever was proposed by the senate to be laid before the people.

The general council or assembly of the people, is composed of the citizens and burghers of the town; their number in general amounting to 1500, though usually not more than 1200 were present; the remainder residing in foreign countries, or being otherwise absent. It meets twice a-year, chooses the principal magistrates, approves or rejects the laws and regulations proposed by the other councils, imposes taxes, contracts alliances, declares war or peace, and nominates half the members of the great council, &c. But the principal check to the power of the senate arose from the right of *re-election*, or the power of annually expelling four members from the senate at the nomination of the *syndics* or principal magistrates, and from the right of representation. The *syndics* are four in number, chosen annually from the senate by the general council; and three years elapse before the same members can be again appointed. In choosing these magistrates, the senate appointed from its own body eight candidates, from whom the four *syndics* were to be chosen by the general council. The latter, however, had it in their power to reject not only the first eight candidates, but also the whole body of senators in succession: in which case, four members of the senate retired into the great council; and their places were filled by an equal number from that council. With regard to the power of representation, every citizen or burgher had the privilege of applying to the senate in order to procure a new regulation in this respect, or of remonstrating against any act of the magistracy. To these remonstrances the magistrates were obliged to give an explicit answer; for if a satisfactory answer was not given to one, a second was immediately presented. The representation was made by a greater or smaller number of citizens according to the importance of the point in question.

5
Account of
the revolution in
1782.

Since the 1776, however, several changes have taken place. This right of *re-election*, which the aristocratical party were obliged to yield to the people in 1768, soon proved very disagreeable, being considered by the former as a kind of ostracism; for which reason they caught at every opportunity of procuring its abolition. They were now distinguished by the title of *negatives*, while the popular party had that of *representants*; and the point in dispute was the compilation of a new code of laws. This measure the negatives opposed, as supposing that it would tend to reduce their prerogatives; while, on the other hand, the representants used their utmost endeavours to promote it, in hopes of having their privileges augmented by this means. At last, in the month of January 1777, the negatives were obliged to comply with the demands of their antagonists; and a committee for forming a new code of laws was appointed by the concurrence of the little, great, and general councils. The committee was to last for two years, and the code to be laid before the three councils for their joint approbation or rejection. A sketch of the first part of the code was presented to the little and great councils on the first of September 1779, that

they might profit by their observations before it was presented to the general council. Great disputes arose; and at length it was carried by the negatives that the code should be rejected and the committee dissolved. The opposite party complained of this as unconstitutional, and violent disputes ensued; the issue of which was, that the great council offered to compile the code, and submit it to the decision of the public. This did not give satisfaction to the popular party, who considered it as insidious: the contentions revived with more fury than ever, until at length the negatives supposing, or pretending to suppose, that their country was in danger, applied to their guaranties, France, Zurich, and Berne, entreating them to protect the laws and constitution. This was productive of no good effect; so that the negatives found no other method of gaining their point than by sowing dissension among the different classes of inhabitants. The natives were discontented and jealous on account of many exclusive privileges enjoyed by that class named *citizens*: they were besides exasperated against them for having, in 1770, banished eight of the principal natives, who pretended that the right of burghership belonged to the natives as well as to the citizens, and demanded that this right ought to be gratuitously conferred instead of being purchased. The negatives, in hopes of making such a considerable addition to their party, courted the natives by all the methods they could think of, promising by a public declaration that they were ready to confer upon them those privileges of trade and commerce which had hitherto been confined exclusively to the citizens. The designs of the negatives were likewise openly favoured by the court of France, and dispatches were even written to the French resident at Geneva to be communicated to the principal natives who sided with the aristocratic party. The attorney-general, conceiving this mode of interference to be highly unconstitutional, presented a spirited remonstrance; by which the French court were so much displeased, that they procured his deposition from his office; and thus their party was very considerably increased among the natives. The representants were by no means negligent in their endeavours to conciliate the favour of the same party, and even promised what they had hitherto opposed in the strongest manner, viz. to facilitate the acquisition of the burghership, and to bestow it as the recompence of industry and good behaviour. Thus two parties were formed among the natives themselves; and the dissensions becoming every day worse and worse, a general insurrection took place on the 5th of February 1781. A dispute, accompanied with violent reproaches, having commenced betwixt two neighbouring and opposite parties of natives, a battle would have immediately taken place, had it not been for the interposition of the *syndics* on the one side, and the chiefs of the representants on the other. The tumult was beginning to subside, when a discharge of musquetry was heard from the arsenal. Some young men who sided with the negatives, having taken possession of the arsenal, had fired by mistake upon several natives of their own party, and had killed one and wounded another. This was considered by the representants as the signal for a general insurrection, on which they instantly took up arms and marched in three columns to the arsenal; but

finding

finding there only a few young men who had rashly fired without orders, they permitted the rest to retire without molestation. In the opinion of some people, however, this affair was preconcerted, and the representants are said to have been the first aggressors.

The representants having thus taken up arms, were in no haste to lay them down. They took possession of all the avenues to the city; and their committee being summoned next morning by the natives to fulfil their engagements with respect to the burghership, they held several meetings with the principal negatives on that subject, but without any success: for though the latter readily agreed to an augmentation of the commercial privileges of the natives, they absolutely refused to facilitate the acquisition of the burghership. The committee, however, embarrassed and alarmed at the number and threats of the natives, determined to abide by what they had promised; drew up an edict permitting the natives to carry on trade, and to hold the rank of officers in the military associations; and conferred the burghership on more than 100 persons taken from the natives and inhabitants, and even from the peasants of the territory. This was approved by the three councils; the negatives, dreading the power of their adversaries, who had made themselves masters of the city, not daring to make their appearance.

Thus the popular party imagined that they had got a complete victory; but they soon found themselves deceived. They were prevailed upon by the deputies from Zurich and Berne (who had been sent to conciliate the differences) to lay down their arms; and this was no sooner done, than these same deputies declared the edict in favour of the natives to be null and illegal. The senate declared themselves of the same opinion; and maintained, that the assent of the councils had been obtained only through fear of the representants who were under arms, and whom none at that time durst oppose. The representants, exasperated by this proceeding, presented another remonstrance on the 18th of March 1782, summoning the magistrates once more to confirm the edict; but a month afterwards received the laconic answer, that "government was neither willing nor able to confirm it." The natives, now finding themselves disappointed in their favourite object at the very time they had such strong hopes of obtaining it, behaved at first like frantic people; and these transports having subsided, an universal tumult took place. The most moderate of the popular party endeavoured in vain to allay their fury, by dispersing themselves in different quarters of the city; and the citizens, finding themselves at last obliged either to abandon the party of the natives or to join them openly, hastily adopted the latter measure; after which, as none could now oppose them, the officers of the representants took possession of the town, and quelled the insurrection. Various negotiations were carried on with the negatives in order to prevail upon them to ratify the edict, but without success: on which a few of the magistrates were confined by the popular party along with the principal negatives; and as they justly expected the interference of France on account of what they had done, they resolved to prolong the confinement of the prisoners, that they might answer the purpose of hostages for their own safety. In the mean time the body of citizens, decei-

ved by the pretences of the popular party, acted as if their power was already established and permanent. In consequence of this, they deposed several members of the great and little councils, appointing in their room an equal number of persons who were favourable to the cause of the representants. The great council thus new modelled, executed the edict for conferring the burghership upon a number of the natives; and appointed a committee of safety, composed of eleven members, with very considerable authority. By this committee the public tranquillity was re-established; after which, the fortifications were ordered to be repaired; and the people were buoyed up by the most dangerous notions of their own prowess, and a confidence that France either durst not attack them or did not incline to do so. In consequence of this fatal error, they refused every offer of reconciliation which was made them from the other party; until at last troops were dispatched against them by the king of Sardinia and the canton of Berne; and their respective generals, Messrs de la Marmora and Lentulus, being ordered to act in concert with the French commander M. de Jaucourt, who had advanced to the frontiers with a considerable detachment. The Genevans, however, vainly puffed up by a confidence in their own abilities, continued to repair their fortifications with indefatigable labour; the peasants repaired from all quarters to the city, offering to mount guard and work at the fortifications without any pay; women of all ranks crowded to the walls as to a place of amusement, encouraging the men, and even assisting them in their labour. The besiegers, however, advanced in such force, that every person of discernment foresaw that all resistance would be vain. The French general Jaucourt, on the 29th of June 1782, dispatched a message to the Syndics; in which he insisted on the following humiliating conditions: 1. That no person should appear on the streets under pain of military punishment. 2. That a certain number of citizens, among whom were all the chiefs of the representants, should quit the place in 24 hours. 3. That all arms should be delivered to the three generals. 4. That the deposed magistrates should be instantly re-established: And, lastly, That an answer should be returned in two hours. By this message the people were thrown into the utmost despair; and all without exception resolved to perish rather than to accept of terms so very disgraceful. They instantly hurried to the ramparts with a view of putting their resolution in force; but in the mean time the Syndics found means to obtain from the generals a delay of 24 hours. During this interval, not only men of all ages prepared for the approaching danger, but even women and children tore the pavement from the streets, carrying the stones up to the tops of the houses, with a view of rolling them down upon the enemy in case they should force their way into the town. About 80 women and girls, dressed in uniforms, offered to form themselves into a company for the defence of their country. The committee of safety accepted their services, and placed them in a barrack secured from the cannon of the besiegers. The negatives were greatly alarmed at this appearance of desperate resistance; and some of the most moderate among them endeavoured, but without success, to effect a reconciliation. At the hour

Geneva. in which it was expected that the attack would begin, the ramparts were filled with defenders; and though the most zealous of the popular party had calculated only on 3000, upwards of 5000 appeared in the public cause. The French general, however, justly alarmed for the prisoners, who were now in imminent danger, again prolonged the period proposed for the capitulation. By these repeated delays the ardour of the defendants began to abate. The women first began to figure to themselves the horrors of a town taken by assault, and given up to an enraged and licentious soldiery; many timid persons found means not only to disguise their own fears, but to inspire others with them under the pretence of prudence and caution: at last the committee of safety themselves, who had so strenuously declared for hostilities, entirely changed their mind. Being well apprized, however, that it would be dangerous for them to propose surrendering in the present temper of the people, they assembled the citizens in their respective circles, representing, that if the city should be attacked in the night, it would be no longer possible to convene them: for which reason they recommended to them that each circle should nominate several deputies with full authority to decide in their stead; adding, that they ought rather to appoint those persons who from their age and respectable character were capable of assisting their country by their advice, while others were defending it by their valour. Thus a new council, composed of about 100 citizens, was formed; in which the chiefs, by various manoeuvres, first intimidating, and then endeavouring to persuade the members of the necessity of surrendering, at last found means to take the thoughts of the people entirely off the defence of the city, and engage them in a scheme of general emigration. A declaration was drawn up to be delivered to the Syndics with the keys of the city, the chiefs summoned the principal officers from their posts, ordered the cannon of several batteries to be rendered unfit for service, and at last took care of themselves by quitting the town. The people were in the utmost despair; and left the town in such multitudes, that when the Sardinians entered it in the morning, they found it almost deserted. This was followed by the restoration of the former magistrates, a complete subjection of the popular party, and the establishment of a military government.

6
New constitution established.

The changes which took place on this occasion were as follow: 1. An abolition of the right of re-election. 2. The abolition of that right by which the general council nominated half the vacancies in the great council. 3. The right of remonstrating was taken from the citizens at large, and vested in 36 adjuncts, who might be present in the great council the first Monday of every month. They enjoyed a right of representation, and in consequence of that had a deliberative voice; but on the whole were so insignificant, that they were nicknamed *Les Images*, or "The Shadows." 4. The introduction of the grabeau, or annual confirmation of the members of the senate and of the great council, vested entirely in the latter. By this law part of the authority both of the senate and general council was transferred to the great council; and by subjecting the senate to this annual revision, its power was greatly lessened, and it was made in fact depend-

ent upon the general council. 5. The circles or clubs in which it was customary to convene the citizens, and all public assemblies whatever, were prohibited; and so rigorously was this carried into execution, that the society of arts was prohibited from meeting: 6. The militia were abolished; firing at marks, even with bows and arrows, was prohibited; and the town, instead of being guarded by the citizens, was now put under the care of 1000 foreign soldiers, whose colonel and major were both to be foreigners. These troops were to take an oath of fidelity to the republic, and of obedience to the great council and the committee of war; but were under the immediate command and inspection of the latter, and subject to the superior control of the former. 7. No person was permitted to bear arms, whether citizen, native, or inhabitant. 8. Several taxes were imposed without the consent of the general council; but in time to come it was provided, that every change or augmentation of the revenue should be submitted to that body. 9. Several privileges with regard to trade and commerce, formerly possessed by the citizens alone, were now granted both to citizens and inhabitants.

It is not to be supposed that this revolution would be agreeable to people who had such a strong sense of liberty, and had been accustomed to put such a value upon it, as the Genevans. From what has been already related, it might seem reasonable to conclude, that an almost universal emigration would have taken place: but after their resentment had time to subside, most of those who fled at first, thought proper to return; and, in the opinion of Mr Coxe, not more than 600 finally left their country on account of the revolution in 1782. The emigrants principally settled at Brussels and Constance, where they introduced the arts of printing linens and watchmaking. Soon after the revolution, indeed, a memorial, signed by above 1000 persons of both sexes, all of them either possessed of some property or versed in trade or manufactures, was presented to the earl of Temple, then lord lieutenant of Ireland, expressing a desire to settle in that kingdom. The proposal met with general approbation; the Irish parliament voted L. 50,000 towards defraying the expenses of their journey, and affording them a proper settlement in the island. Lands were purchased for L. 8000 in a convenient situation near Waterford; part of New Geneva was actually completed at the expense of L. 10,000; a charter was granted with very considerable privileges; the standard of gold was altered for the accommodation of the watch manufacturers; and the foundation of an academy laid upon an useful and liberal plan. Several Genevans landed in Ireland in the month of July 1783; but when the nation had expended near L. 30,000 on the scheme, it was suddenly abandoned. This seems principally to have been owing to the delays necessarily occasioned in the execution of such a complicated plan; and in some degree also by the high demands of the Genevan commissioners, who required many privileges inconsistent with the laws of Ireland. By these delays the Genevans, whose character seems not to be *perseverance*, were induced to abandon the scheme, and return to their former place of residence. Even the few who had already landed, though maintained at the public expense, were discontented at not finding the new town prepared for their

Geneva.

7
Scheme of settling a number of Genevans in Ireland.

recep-

Geneva.

reception; and as these among the proposed emigrants who possessed the greatest share of property had already withdrawn their names, the remainder did not choose to remain in a country where they had not capital sufficient to carry on any considerable trade or manufacture. A petition was then presented by the Genevan commissioners, requesting that L. 10,000 of the L. 50,000 voted might be appropriated to the forming a capital; but as this had been voted for other purposes, the petition was of course rejected; in consequence of which, the Genevans relinquished the settlement by an address, and soon after quitted the island.

8
New revolution in
1789.

The people of Old Geneva, though returned to their former place of abode, were far from being inclined to submit to the yoke with patience. They were obliged to pay heavy taxes for maintaining a military force expressly calculated to keep themselves in subjection; and so intolerable did this appear, that in a few years every thing seemed ready for another revolution. The success of this seemed more probable than that of the former, as France was not now in a condition to interfere as formerly. The general ferment soon rose to such a height, that government was obliged to call in the aid of the military to quell a tumult which happened in the theatre. This produced only a temporary tranquillity; another tumult took place on the 26th of January 1789, on account of the publication of an edict raising the price of bread a farthing per pound. On this the people instantly rose; plundered the bakers shops; and next day a carriage loaded with bread and escorted by soldiers was plundered in its way to the distribution office. The soldiers fired on the populace, by which one man was killed and another wounded; but the tumult still increasing, the soldiers were driven away; and the body of the deceased was carried in a kind of procession before the town-house, as a monument of the violence and oppression of the aristocratic party. The magistrates in the mean time spent their time in deliberation, instead of taking any effectual method of quelling the insurrection. The people made the best use of the time afforded them by this delay of the magistrates: they attacked and carried two of the gates, dangerously wounding the commanding officer as he attempted to allay the fury of both parties. At last the magistrates dispatched against them a considerable body of troops, whom they thought the insurgents would not have the courage to resist; but in this they found themselves deceived. The people had formed a strong barricade, behind which they played off two fire pumps filled with boiling water, and soap lyes against the extremities of two bridges which the military had to cross before they could attack them. The commanding officer was killed and several of his men wounded by the discharge of small arms from windows; and the pavement was carried up to the tops of houses in order to be thrown down upon the troops if they should force the barricades and penetrate into the streets. The tumult in the mean time continued to increase, and was in danger of becoming universal; when the magistrates, finding it would be impossible to quell the insurgents without a great effusion of blood, were reduced to the necessity of complying with their demands. One of the principal magistrates repaired in person to the quarter of St. Gervais, pro-

claimed an edict for lowering the price of bread, granted a general amnesty, and released all the insurgents who had been taken into custody. Thus a momentary calm was produced; but the leaders of the insurrection, sensible that the magistrates were either unable or unwilling to employ a sufficient force against them, resolved to take advantage of the present opportunity to procure a new change of government. A new insurrection, therefore, took place on the 29th of the month, in which the soldiers were driven from their posts, disarmed, and the gates seized by the people. The magistrates then, convinced that all opposition was fruitless, determined to comply with the demands of their antagonists in their full extent; and the aristocratical party suddenly changing their sentiments, renounced in a moment that system to which they had hitherto so obstinately adhered. On the application of the solicitor general, therefore, for the recovery of the ancient liberties of the people, the permission of bearing arms, re-establishment of the militia, and of their circles or political clubs, the removal of the garrison from the barracks, and the recall of the representatives who were banished in 1782; these moderate demands were received with complacency, and even satisfaction. The preliminaries were settled without difficulty, and a new edict of pacification was published under the title of *Modifications a l'Edit de 1782*, and approved by the senate, great council, and general council. So great was the unanimity on this occasion, that the modifications were received by a majority of 1321 against 52. The pacification was instantly followed by marks of friendship betwixt the two parties which had never been experienced before; the sons of the principal negatives frequented the circles of the burghers; the magistrates obtained the confidence of the people; and no monument of the military force so odious to the people will be allowed to remain. "The barracks of the town-house (says Mr Coxe) are already evacuated, and will be converted into a public library; the new barracks, built at an enormous expence, and more calculated for the garrison of a powerful and despotic kingdom than for a small and free commonwealth, will be converted into a building for the university. The reformation of the studies, which have scarcely received any alteration since the time of Calvin, is now in agitation. In a word, all things seem at present to conspire for the general good; and it is to be hoped that both parties, shocked at the recollection of past troubles, will continue on as friendly terms as the jealous nature of a free constitution will admit."

GENEVA Lake. This lake is in the shape of a crescent; along the concave side of which Mr Coxe travelled 54 miles. Switzerland forms the hollow, and Savoy the convex part; the greatest breadth being about 12 miles. The country on the side of Savoy is full of high and craggy mountains; but from Geneva to the environs of Lausanne it slopes to the margin of the lake, and is very rich and fertile. The banks rise considerably in the neighbourhood of Lausanne, and form a most beautiful terrace, with a rapid descent a few miles beyond the town. A plain begins in the neighbourhood of Vevay, which continues for a great way beyond the end of the lake, but contracting towards the water by the approach of the mountains.

Geneva
||
Geneva
Lake.

Geneva,
Genial.

The lake itself appears at a distance of a beautiful blue colour, and the water is very clear and transparent. Near Geneva the coast of the lake abounds with pebbles; between that city and Lausanne it is sandy; from thence to Chillon it is bounded by hard calcareous rocks; and the extremity of the shore is a marsh formed by mud collected from the river Rhone. The greatest depth of this lake found by M. de Luc is 160 fathoms. Here the birds called *tippet grebes* make their appearance in December, and retire in February to other places where they breed. They make floating nests of reeds; but as the lake of Geneva affords none of these, they are obliged to migrate to other places where they grow. Their skins are much esteemed, and sell for 12 or 14 s. each. The lake of Geneva, like all others situated between mountains, is subject to sudden storms.

GENEVA, or *Gin*, among distillers, an ordinary malt spirit, distilled a second time, with the addition of some juniper-berries.

Originally, the berries were added to the malt in the grinding; so that the spirit thus obtained was flavoured with the berries from the first, and exceeded all that could be made by any other method. At present, they leave out the berries entirely, and give their spirits a flavour by distilling them with a proper quantity of oil of turpentine; which, though it nearly resembles the flavour of juniper-berries, has none of their valuable virtues.

GENEVIEVE, fathers or religious of; the name of a congregation of regular canons of the order of St Augustine, established in France.

The congregation of St Genevieve is a reform of the Augustine canons. It was begun by St Charles Faure, in the abbey of St Vincent de Senlis, of which he was a member in the year 1618.

In the year 1634, the abbey was made elective; and a general chapter, composed of the superiors of 15 houses who had now received the reform, chose F. Faure coadjutor of the abbey of St Genevieve, and general of the whole congregation. Such were its beginnings.

It has since increased very much, and it now consists of above a hundred monasteries; in some whereof the religious are employed in the administration of the parishes and hospitals; and in others in the celebration of divine service, and the instruction of ecclesiastics in seminaries for the purpose.

The congregation takes its name from the abbey of St Genevieve, which is the chief of the order, and whose abbot is the general thereof. The abbey itself took its name from St Genevieve, the patroness of the city of Paris, who died in the year 512. Five years after her death, Clovis erected the church of St Genevieve, under the name and invocation of St Peter, where her relics are still, or were till lately, preserved, her shrine visited, and her image carried with great processions and ceremonies upon extraordinary occasions, as when some great favour is to be intreated of heaven.

GENGISKHAN, the renowned sovereign of the Moguls, a barbarous and bloody conqueror. See JENGHIZ KHAN, and (*History of the*) MOGULS.

GENIAL, an epithet given by the Pagans to cer-

Nº 136.

tain gods who were supposed to preside over generation.

The genial gods, says Festus, were earth, air, fire, and water. The twelve signs, together with the sun and moon, were sometimes also ranked in the number.

GENII, a sort of intermediate beings, by the Mahometans believed to exist, between men and angels. They are of a grosser fabric than the latter, but much more active and powerful than the former. Some of them are good, others bad, and they are capable of future salvation or damnation like men. The Orientals pretend that these genii inhabited the world many thousand years before the creation of Adam, under the reigns of several princes, who all bore the common name of Solomon: that falling at length into an almost general corruption, Eblis was sent to drive them into a remote part of the earth, there to be confined; and that some of that generation still remaining were by Tahmurath, one of the ancient kings of Persia, forced to retreat into the famous mountain of *Kaf*; of whose successions and wars they have many fabulous and romantic stories. They also made several ranks and degrees among this kind of beings (if they are not rather different species); some being absolutely called *jin*; some *Peri*, or fairies; some *Div*, or giants; and other *Tacwins*, or fates.

GENIOGLOSSI, in anatomy. See ANATOMY, *Table of the Muscles*.

GENIOHYOIDÆUS, in anatomy. *Ibid.*

GENIOSTOMA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants. The calyx is a turbinated quinquefid perianthium; the corolla monopetalous and tubular; the stamina five short filaments; the antheræ oblong; the seeds very numerous and subangulated, placed on a filiform receptacle.

GENIPPA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 30th order, *Contorta*. The corolla is wheel-shaped; the stigma club-shaped; the berry bilocular; the seeds nestling in a carnos heart-shaped substance.

GENISTA, BROOM, or DYERS-WEED: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionacea*. The calyx is bilabiate, the upper lip bidentate, the under one tridentate; the vexillum is oblong and reflexed, or turned back from the pistil and stamina. There are several species; of which the most remarkable are, the cytiso-genista, or common broom; and the tinctoria, or dyers weed.—The first is too well known to need description. Its young flowers are sometimes preserved as pickles; and the plant, when burnt, affords a tolerably pure alkaline salt. Dr Mead relates the case of a dropsical patient that was cured by taking half a pint of a decoction of green broom tops, with a spoonful of whole white mustard seed, every morning and evening. The patient had been tapped three times, and tried the usual remedies before. An infusion of the seeds, drank freely, has been known to produce similar happy effects; but these are by no means to be expected in every instance. Cows, horses, and sheep, refuse the plant.—2. The tinctoria is also a native of Britain.

Genil
Genista.

It rises with shrubby stalks three feet high, garnished with spear-shaped leaves placed alternate, and terminated by several spikes of yellow flowers, succeeded by pods. The branches of the plant are used by dyers for giving a yellow colour; from whence it is called *dyers-broom*, *green-wood*, *wood-waxen*, or *dyers-weed*. A dram and an half of the powdered seeds operates as a mild purgative. A decoction of the plant is diuretic; and, like the former, has proved serviceable in dropical cases. Horses, cows, goats, and sheep, eat it.

GENITAL, an appellation given to whatever belongs to the parts of generation. See **ANATOMY**, n^o 107, 108.

GENITES, among the Hebrews, those descended from Abraham, without any mixture of foreign blood.

The Greeks distinguished by the name of *genites* such of the Jews as were issued from parents, who, during the Babylonish captivity, had not allied with any gentile family.

GENITIVE, in grammar, the second case of the declension of nouns. The relation of one thing considered as belonging in some manner to another, has occasioned a peculiar termination of nouns called the *genitive case*; but in the vulgar tongues they make use of a sign to express the relation of this case. In English they prefix the particle *of*, in French *de* or *du*, &c. Though in strictness there are no cases in either of these languages; inasmuch as they do not express the different relations of things by different terminations, but by additional prepositions, which is otherwise in the Latin.

GENIUS, a good or evil spirit or dæmon, whom the ancients supposed set over each person, to direct his birth, accompany him in life, and to be his guard. See **DÆMON**.

Among the Romans, Festus observes, the name *genius* was given to the god who had the power of doing all things, *deum qui vim obtineret rerum omnium gerendarum*; which Vossius, *de Idol.* rather chooses to read *genendarum*, who has the power of producing all things; by reason Censorinus frequently uses *gerere* for *signere*.

Accordingly, St Augustin *de Civitat. Dei*, relates, from Varro, that the genius was a god who had the power of generating all things; and presided over them when produced.

Festus adds, that Aufustius spake of the genius as the Son of God, and the Father of men, who gave them life; others, however, represented the genius as the peculiar or tutelary god of each place: and it is certain, the last is the most usual meaning of the word. The ancients had their *genii* of nations, of cities, of provinces, &c. Nothing is more common than the following inscription on medals, **GENIUS POPULI ROM.** "the genius of the Roman people;" or **GENIO POP. ROM.** "to the genius of the Roman people." In this sense, *genius* and *lar* were the same thing; as, in effect, Censorinus and Apulius affirm they were. See **LARES** and **PENATES**.

The Platonists, and other eastern philosophers, supposed the *genii* to inhabit the vast region or extent of air between earth and heaven. They were a sort of intermediate powers, who did the office of mediators

between gods and men. They were the interpreters and agents of the gods; communicated the wills of the deities to men; and the prayers and vows of men to the gods. As it was unbecoming the majesty of the gods to enter into such trifling concerns; this became the lot of the *genii*, whose nature was a mean between the two; who derived immortality from the one, and passions from the other; and who had a body framed of an aerial matter. Most of the philosophers, however, held, that the *genii* of particular men were born with them, and died; and Plutarch attributes the ceasing of oracles partly to the death of the *genii*. See **ORACLE**.

The heathens, who considered the *genii* as the guardians of particular persons, believed that they rejoiced and were afflicted at all the good and ill fortune that befel their wards. They never, or very rarely, appeared to them; and then only in favour of some person of extraordinary virtue or dignity. They likewise held a great difference between the *genii* of different men; and that some were much more powerful than others: on which principle it was, that a wizard in *Ap-pian* bids Anthony keep at a distance from Octavius, by reason Anthony's genius was inferior to and stood in awe of that of Octavius. There were also evil *genii*, who took a pleasure in persecuting men, and bringing them evil tidings: such was that in *Paterculus*, &c. which appeared to Brutus the night before the battle of Philippi. These were also called *larvæ*, and *lemures*. See **LARVÆ** and **LEMURES**.

GENIUS, in matters of literature, &c. a natural talent or disposition to do one thing more than another; or the aptitude a man has received from nature to perform well and easily that which others can do but indifferently and with a great deal of pains.

To know the bent of nature is the most important concern. Men come into the world with a genius determined not only to a certain art, but to certain parts of that art, in which alone they are capable of success. If they quit their sphere, they fall even below mediocrity in their profession. Art and industry add much to natural endowments, but cannot supply them where they are wanting. Every thing depends on genius. A painter often pleases without observing rules; whilst another displeases though he observes them, because he has not the happiness of being born with a genius for painting.

A man born with a genius for commanding an army, and capable of becoming a great general by the help of experience, is one whose organical conformation is such, that his valour is no obstruction to his presence of mind, and his presence of mind makes no abatement of his valour. Such a disposition of mind cannot be acquired by art: it can be possessed only by a person who has brought it with him into the world. What has been said of these two arts may be equally applied to all other professions. The administration of great concerns, the art of putting people to those employments for which they are naturally formed, the study of physic, and even gaming itself, all require a genius. Nature has thought fit to make a distribution of her talents among men, in order to render them necessary to one another; the wants of men being the very first link of society: she has therefore pitched upon particular persons, to give them aptitude to perform rightly

some

Genius,
Genoa.

some things which she has rendered impossible to others; and the latter have a greater facility granted them for other things, which facility has been refused to the former. Nature, indeed, has made an unequal distribution of her blessings among her children; yet she has disinherited none; and a man divested of all kinds of abilities, is as great a phenomenon as an universal genius.

From the diversity of genius, the difference of inclination arises in men, whom nature has had the precaution of leading to the employments for which she designs them, with more or less impetuosity in proportion to the greater or lesser number of obstacles they have to surmount in order to render themselves capable of answering this vocation. Thus the inclinations of men are so very different, because they follow the same mover, that is, the impulse of their genius. This, as with the painter, is what renders one poet pleasing, even when he trespasses against rules; while others are disagreeable, notwithstanding their strict regularity.

The genius of these arts, according to the abbe du Bos consists in a happy arrangement of the organs of the brain; in a just conformation of each of these organs; as also in the quality of the blood, which disposes it to ferment, during exercise, so as to furnish plenty of spirits to the springs employed in the functions of the imagination. Here he supposes that the composer's blood is heated; for that painters and poets cannot invent in cool blood; nay, that it is evident they must be wrapt into a kind of enthusiasm when they produce their ideas. Aristotle mentions a poet who never wrote so well as when his poetic fury hurried him into a kind of frenzy. The admirable pictures we have in Tasso of Armida and Clorinda, were drawn at the expence of a disposition he had to real madness, into which he fell before he died. "Do you imagine (says Cicero), that Pacuvius wrote in cold blood? No, it was impossible. He must have been inspired with a kind of fury, to be able to write such admirable verses."

GENOA, a city of Italy, and capital of a republic of the same name, situated in E. Long. 9. 30. N. Lat. 44. 30.—By the Latin authors it is very frequently, though corruptly, called *Janua*; and its present territories made part of the ancient Liguria. The era of its foundation is not known. In the time of the second Punic war it was a celebrated emporium; and having declared for the Romans, was plundered and burnt by Mago the Carthaginian. It was afterwards rebuilt by the Romans; and with the rest of Italy continued under their dominions till the decline of the western empire in 476. Soon after, it fell under the power of Theodoric the Ostrogoth; who having defeated the usurper Odoacer, became king of Italy. This happened in the year 498; and in a short time, the Goths being almost entirely subdued by Belisarius the emperor Justinian's general, Genoa was reannexed to the Roman empire. In 1638, it was plundered and burnt by the Lombards, whose king Protharis erected it into a provincial dukedom.

The Lombards continued masters of Genoa till the year 774, when they were conquered by Charles the Great, son to Pepin king of France. He reduced Liguria to the ancient bounds settled by Augustus,

and erected it into a marquisate; appointing his relation *Audemarus* the first count or margrave. Genoa at this time being distinguished for its wealth and populousness, began to give its name to the whole coast; and continued under the dominion of these counts for about 100 years, till the race of the Pepins became entirely extinct in Italy, and the empire was transferred to the German princes.—In the year 935 or 936, while the Genoese forces were absent on some expedition, the Saracens surprised the city, which they plundered and burnt, putting to death a great number of the inhabitants, and carrying others into captivity. Having embarked their captives, together with an immense booty, they set sail for Africa: but the Genoese immediately returning, pursued the invaders; and having entirely defeated them, recovered all the captives and booty, and took a great many of the enemy's ships.

About the year 950, the Franks having lost all authority in Italy, the Genoese began to form themselves into a republic, and to be governed by their own magistrates, who were freely elected, and took the name of *Consuls*. In order to support their independence, they applied themselves with great assiduity to commerce and navigation; and being apprehensive that some of the German emperors, who frequently entered Italy as invaders, might renew their pretensions to their state, they consented to acknowledge Berengarius III. duke of Friuli, who had been elected emperor by a party of Italian nobles. Berengarius, who had much ado to maintain himself in his new dignity, endeavoured by his concessions to enlarge the number of his friends and adherents; and accordingly made no difficulty to confirm the new republic in all its rights and privileges. After this the Genoese began to extend their commerce from Spain to Syria, and from Egypt to Constantinople; their vessels, according to the custom of these times, being fitted for fighting as well as merchandize. Having thus acquired great reputation, they were invited in 1017, by the Pisans, who had likewise formed themselves into a republic, to join with them in an expedition against Sardinia, which had been conquered by the Moors. In this expedition they were successful; the island was reduced; but from this time an enmity commenced between the two republics, which did not end but with the ruin of the Pisans.

The first war with Pisa commenced about 30 years after the Sardinian expedition, and lasted 18 years; when the two contending parties having concluded a treaty of peace, jointly sent their forces against the Moors in Africa, of whom they are said to have killed 100,000. The Genoese were very active in the time of the crusades, and had a principal share in the taking of Jerusalem. They also waged considerable war with the Moors in Spain, of whom they generally got the better. They also prevailed against the neighbouring states; and, in 1220, had enlarged their territories beyond the skirts of the Apennines, so that the rest of Italy looked upon them with a jealous eye: but in 1311 the factions which had for a long time reigned in the city, notwithstanding all its wealth and power, induced the inhabitants to submit themselves for 20 years to the dominion of Henry VII. emperor of Germany. That emperor, however, died in August 1312; and the vicar he had left, soon after went to Pisa, upon

Genoa.

Genoa. on which the dissensions in Genoa revived with greater fury than ever. In 1317, a quarrel happened between the families of Spinola and Doria; which came to such an height, that both parties fought in the streets for 24 days without intermission, raised battering engines against each others houses, and filled the city with blood. At last the Spinola quitted the city, and retired to their territories in the Apennine mountains. The civil war continued till the year 1331; when, by the mediation of the king of Naples, it was concluded, that all exiles should return to the city; that the republic should be governed by the king's vicar; and all the offices of the state be equally divided between the Guefts and the Gibellines, the two contending parties.

By this ruinous war, the coast of Genoa, formerly adorned with palaces and vineyards, was now reduced to the appearance of a barren waste. So great was the general desolation, that, according to Petrarch, the spectators who sailed along were struck with astonishment and horror. Villani, a cotemporary author, relates, that it was supposed by the learned, that greater exploits had not been performed at the siege of Troy; and that the losses each party had sustained would have been sufficient to have purchased a kingdom, the Genoese republic being in his time the richest and most powerful state in Christendom. The annalist Stella informs us, that, before the war, the most extravagant profusion and luxury prevailed among the Genoese: but that, towards the end, many noble families were reduced to indigence and poverty; so that, about 100 years after, it became fashionable for the nobles to live in a plain manner, without any show or magnificence.

In 1336, both parties, suspending their mutual animosities, sent two fleets of 20 galleys each into the German ocean, to the assistance of the king of France, who was engaged in a war with Edward III. king of England. This naval expedition proved the cause of a most remarkable revolution in the Genoese government. The sailors of the fleet, thinking themselves injured by their officers, whom they accused of defrauding them of their pay, proceeded to an open mutiny; and, having expelled the admiral, and other commanders, seized the galleys. The king of France being chosen arbitrator, decided in favour of the officers, and imprisoned 16 of the chiefs of the mutineers. Upon this several of the sailors left the fleet, and returned to Genoa; where they went round the coasts, repeating their mutinous complaints, which were greatly hearkened to, upon a false report that the mutineers who had been imprisoned were broke upon the wheel. The factious spirit increased; and at last the Genoese insisted in a tumultuous manner for having an abbot of their own choosing, and 20 of the people with the consent of the captains of the republic assembled for that purpose. While the mob were impatiently expecting their decision, a mechanic, generally accounted a fool, mounted a wooden bench, and called out that one Simon Bucanigree should be chosen abbot. This being instantly echoed by the populace, he was first declared *abbot*, then *lord*, and at last *duke* of Genoa.

This new expedient did not at all answer the purpose. The dissensions continued as violent as ever, notwithstanding the power of the new magistrates;

and by these perpetual divisions the republic was at last so much weakened, that in 1390 the king of France was declared Lord of Genoa. Under the French government, however, they soon became exceedingly impatient; and, in 1422, the duke of Milan obtained the sovereignty. With this situation they were equally displeased, and therefore revolted in 1436. Twenty-two years after, finding themselves pressed by a powerful fleet and army sent by Alphonso king of Naples, they again conferred the sovereignty of their state upon the king of France. In 1460, they revolted from the French; and, four years after, put themselves again under the protection of the duke of Milan; from whom they revolted in 1478. He was again declared sovereign of the republic in 1488; and, 11 years after, the city and territories of Genoa were conquered by Louis XII. of France.

The almost unparalleled fickleness of the Genoese disposition was not to be corrected by this misfortune. They revolted in 1506; but next year were again subdued by Louis. Six years after, they again revolted; and in 1516, the city was taken and plundered by the Spaniards. In 1528, Andrew Doria, a Genoese admiral in the service of the French, undertook to rescue his country from the dominion of foreign princes, and restore it to its liberty. Knowing well the fickle disposition of his countrymen, he took all occasions of exciting discontents among them against the government. He persuaded them, that the French (who had again obtained the sovereignty) had left them only a shadow of liberty, while they pretended to protect them from their enemies. To the nobility he represented the disgrace of suffering the government to be vested in the hands of foreigners less worthy of authority than themselves. Thus he soon formed a strong faction, and formed his plan; for the execution of which he took the most proper time, namely, when almost three-fourths of the French garrison had been carried off by the plague. He advanced with 500 men; and his friends having opened the gates of the city to him, he seized the principal posts, and thus became master of it without drawing his sword. The garrison retired to the forts, where they soon after capitulated, and being driven out of the city, Doria re-established the ancient form of government. See DORIA.

The republic hath since continued to preserve her liberty, though greatly fallen from her ancient splendor, and now become a very inconsiderable state. In 1684, the Genoese had the misfortune to fall under the resentment of Louis XIV. at which time the city was almost destroyed by a formidable bombardment. In the year 1688, it was bombarded by admiral Byng, and forced to capitulate; but there were at that time no views of making a permanent conquest of the city. In 1730, the island of Corsica revolted from the Genoese, and could never afterwards be reduced by them; for which reason it was sold to the French, who in the year 1770 totally reduced it.

The Genoese territories extend along that part of the Mediterranean sea, commonly called the *gulf of Genoa*; about 152 miles; but their breadth is very unequal, being from eight to about 20 miles. Where they are not bounded by the sea, the following states and countries, taking them from west to east, are their

Genoa. boundaries, viz. Piedmont, Montferat, Milan, Placentia, Parma, the dukedom of Tuscany, and the republic of Lucca. This tract, though a great part of it is mountainous, and some of that barren enough, yet produces plenty of excellent fruit, good pasture, wood, garden-stuff, and mulberry-trees, with some wine and oil, but little corn. What they want of the last, they have either from Lombardy, Sicily, or Naples.

Genoa stands on the coast of the Mediterranean sea, at the bottom of a little gulph, partly on the flat, and partly on the declivity, of a pleasant hill; in consequence of which, it appears to great advantage from the sea. It is defended on the land-side by a double wall, which in circumference is about ten Italian miles. Two of the streets consist entirely of a double straight row of magnificent palaces. The others, though clean and well paved, are crooked and narrow. The palaces of the nobility are almost all of marble, and many of them are painted on the outside. That there should be such a profusion of marble here, is not to be wondered at, as the neighbouring hills abound with it. The city contains a vast number of palaces, churches, and convents, and several hospitals. The palace where the doge resides, and where the great and little council, and the two colleges of the procuratori and governatori assemble, is a large stone building in the centre of the city: but it contains some fine paintings in fresco; two statues of Andrew and John Doria in white marble; and an arsenal, in which are said to be arms for thirty-four thousand men, with a shield, containing one hundred and twenty pistol-barrels, and thirty-three coats of mail, which, it is pretended, were worn by as many Genoese heroines in a crusade. Of the churches, the finest are those of the Annunciation, St Mary Carignan, St Dominic, and St Martha. In the cathedral is a dish made of a single emerald. All the inhabitants here, except the principal ladies, who are carried in chairs, walk on foot, on account of the narrowness or steepness of the streets. The fortifications of the city, towards the sea, are remarkably strong. There are two fine stone-bridges over the rivers Bonzevera and Bisagno, the first whereof washes the west, and the other the east side of the city, within which there is also a surprising stone-bridge joining two hills. The harbour, though large, is far from being safe; but no care or expence have been spared to render it as safe and commodious as possible. The wind to which it is most exposed, is that called *Labeccio*, or the south-west. The place where the republic's galleys lie, is called the *Darsena*, where are a great number of Turkish slaves. On a rock, on the west side of the harbour, is the fanal or light-house, a high tower, on the top of which is a lanthorn, containing thirty-six lamps. The trade of Genoa is chiefly in velvets, damasks, plush, and other silks, brocades, lace, gloves, sweetmeats, fruits, oil, Parmesan cheese, anchovies, and medicinal drugs from the Levant; but the badness of the harbour, and the high price of commodities, greatly check its commerce. In 1751, Genoa was declared a free port for ten years, under certain restrictions: in that called *Porto Franco*, any merchant may have a ware-house, and import or export goods duty-free; but such as are disposed of in the city, or on the continent, are taxed pretty high. The nobility are allowed to trade in the wholesale way; to carry

on velvet, silk, and cloth manufactures; and to have shares in merchant-ships: and some of them, as the Palavacini, are actually the greatest merchants in Genoa. Another very profitable article of trade carried on by them is banking, and dealing in bills of exchange. A new academy of painting, sculpture, civil and military architecture, was instituted here in 1751. One may walk the streets of Genoa in the night with the greatest safety, which is more than can be said of many cities in Italy. Excessive splendor and luxury are, in several respects, restrained by salutary laws. No beggars are permitted to ask alms in Genoa, and the inns are better than those at Turin. When a single person is buried, a kind of garland of all sorts of artificial flowers is placed on the coffin. The Genoese in general are esteemed crafty, industrious, and inured to labour above the other Italians.

GENSING. See PANAX.

GENTIANA, GENTIAN, in botany: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 20th order, *Rotaceae*. The corolla is monopetalous; the capsule bivalved and unilocular; there are two longitudinal receptacles. The most remarkable species are the following:

1. The lutea, or common gentian of the shops. It is a native of the mountainous parts of Germany; from whence the roots, the only part used in medicine, are brought to this country. These have a yellowish-brown colour, and a very bitter taste. The lower leaves are of an oblong oval shape, a little pointed at the end, stiff, of a yellowish green, and have five large veins on the back of each. The stalk rises four or five feet high, garnished with leaves growing by pairs at each joint, almost embracing the stalk at their base. They are of the same form with the lower, but diminish gradually in their size to the top. The flowers come out in whirls at the joints on the upper part of the stalks, standing on short foot-stalks, whose origin is in the wings of the leaves. They are of a pale yellow colour.—The roots of this plant are very frequently used in medicine as stomachic bitters. In taste they are less exceptionable than most of the substances of this class. Infusions of gentian-root flavoured with orange-peel, are sufficiently grateful. Some years ago a poisonous root was discovered among the gentian brought to London; the use of which occasioned violent disorders, and in some cases death. This root is easily distinguished from the gentian, by its being internally of a white colour, and void of bitterness.

2. The centaureum, or lesser centaury of the shops, is a native of many parts of Britain. It grows on dry pastures; and its height is commonly proportioned to the goodness of the soil, as in rich soils it will grow to the height of a foot, but in poor ones not above three or four inches. It is an annual plant, with upright branching stalks, garnished with small leaves, placed by pairs. The flowers grow in form of an umbel at the top of the stalk, and are of a bright purple colour. They come out in July, and the seed ripens in autumn. The plant cannot be cultivated in gardens. The tops are an useful aperient bitter, in which view they are often used in the present practice of medicine.

Gentile
||
Gentilis.

Gentilis,
Gentlemen.

GENTILE, in matters of religion, a Pagan, or worshipper of false gods.

The origin of this word is deduced from the Jews, who called all those who were not of their name גוים *gojim*, i. e. *gentes*, which in the Greek translations of the Old Testament is rendered *τα εθνη*; in which sense it frequently occurs in the New Testament; as in Matth. vi. 32. "All these things the nations or Gentiles seek." Whence the Latin church also used *gentes* in the same sense as our *Gentiles*, especially in the New Testament. But the word *gentes* soon got another signification, and no longer meant all such as were not Jews; but those only who were neither Jews nor Christians, but followed the superstitions of the Greeks and Romans, &c. In this sense it continued among the Christian writers, till their manner of speech, together with their religion, was publicly and by authority received in the empire; when *gentiles*, from *gentes*, came into use: and then both words had two significations, viz. in treatises or laws concerning religion, they signified Pagans, neither Jews nor Christians; and in civil affairs, they were used for all such as were not Romans.

GENTILE, in the Roman law and history, a name which sometimes expresses what the Romans otherwise called *barbarians*, whether they were allies of Rome or not: but this word was used in a more particular sense for all strangers and foreigners not subject to the Roman empire.

GENTILESCHI (Horatio), an Italian painter, was born at Pisa in 1563. After having made himself famous at Florence, Rome, Genoa, and other parts of Italy, he removed to Savoy; from whence he went to France, and at last, upon the invitation of Charles I. came over to England. He was well received by that king, who appointed him lodgings in his court, together with a considerable salary; and employed him in his palace at Greenwich, and other public places. The most remarkable of his performances in England, were the ceilings of Greenwich and York-house. He did also a Madonna, a Magdalen, and Lot with his two daughters, for king Charles; all which he performed admirably well. After the death of the king, when his collection was exposed to sale, nine pictures of Gentileschi were sold for 600 l. and are now said to be the ornaments of the hall in Marlborough-house. His most esteemed piece abroad was the portico of cardinal Bentivoglio's palace at Rome. He made several attempts in face-painting, but with little success; his talent lying altogether in histories, with figures as big as the life. He was much in favour with the duke of Buckingham, and many others of the nobility. After 12 years continuance in England, he died here at 84 years of age, and was buried in the queen's chapel at Somerset-house. His print is among the heads of Vandyke, he having been drawn by that great master. He left behind him a daughter, *Artemisia Gentileschi*, who was but little inferior to her father in history-painting, and excelled him in portraits.

GENTILIS (Albericus), professor of civil law at Oxford; an Italian by birth. He had quitted Italy with his father, on account of religion. He wrote several works; three books, in particular, *De jure belli*,

which have not been unserviceable to Grotius. He died at London in 1608.

GENTILIS (Scipio), brother to the former, and as celebrated a civilian as he, forsook his native country that he might openly profess the Protestant religion. He was counsellor of the city of Nuremberg, and professor of law with uncommon reputation. He was a great humanist; and in his lectures, as well as books, mixed the flowers of polite learning with the thorns of the law. He died in 1616.

GENTLEMAN. Under this denomination are comprehended all above the rank of yeomen*, where-

* See Commonalty.

A gentleman is usually defined to be one, who, without any title, bears a coat of arms, or whose ancestors have been freemen: and by the coat that a gentleman giveth, he is known to be, or not to be, descended from those of his name that lived many hundred years since.

The word is formed of the French *gentilhomme*; or rather of *gentil*, "fine, fashionable, or becoming;" and the Saxon *man*, q. d. *honestus*, or *honesto loco natus*.—The same signification has the Italian *gentilhuomo*, and the Spanish *hidalgo*, or *hijo dalgo*, that is, the son of somebody, or of a person of note.—If we go farther back, we shall find *gentleman* originally derived from the Latin *gentilis homo*; which was used among the Romans for a race of noble persons of the same name, born of free or ingenuous parents, and whose ancestors had never been slaves or put to death by law. Thus Cicero in his *Topics*, "*Gentiles sunt, qui inter se eodem sunt nomine, ab ingenuis oriundi, quorum majorum nemo servitutem servivit, qui capite non sunt diminuti, &c.*"—Some hold that it was formed from *gentile*, i. e. pagan; and that the ancient Franks, who conquered Gaul, which was then converted to Christianity, were called *gentiles* by the natives, as being yet heathens.—Others relate, that towards the declension of the Roman empire, as recorded by Ammianus Marcellinus, there were two companies of brave soldiers, the one called *gentilium*, and the other *scutarii*; and that it was hence we derive the names *gentleman* and *esquire*. See **ESQUIRE**.—This sentiment is confirmed by Pasquiere, who supposes the appellation *gentiles* and *ecuyers* to have been transmitted to us from the Roman soldiery; it being to the *gentiles* and *scutarii*, who were the bravest of the soldiery, that the principal benefices and portions of lands were assigned. See **BENEFICE**.—The Gauls observing, that during the empire of the Romans, the *scutarii* and *gentiles* had the best tenements or appointments of all the soldiers on the frontiers of the provinces, became insensibly accustomed to apply the same names, *gentilhommes* and *ecuyers*, to such as they found their kings gave the best provisions or appointments to.

GENTLEMAN *Usher of the Black Rod*. See **ROD**.

GENTLEMEN of the Chapel; officers whose duty and attendance is in the royal chapel, being in number 32: Twelve of them are priests; the other 20, commonly called *clerks of the chapel*, assist in the performance of divine service. One of the first 12 is chosen for confessor of the household; whose office is to read prayers every morning to the household servants, to visit the sick, examine and prepare communicants, and administer.

Gentoo. nister the sacrament. One of 20 clerks, well versed in music, is chosen first organist, who is master of the children, to instruct them in music, and whatever else is necessary for the service of the chapel; a second is likewise an organist; a third a lutanist; and a fourth a violist. There are likewise three vergers, so called from the silver rods they carry in their hands; being a serjeant, a yeoman, and groom of the vestry: the first attends the dean and sub-dean, and finds surplices and other necessaries for the chapel; the second has the whole care of the chapel, keeps the pews, and seats the nobility and gentry; the groom has his attendance within the chapel-door, and looks after it.

GENTOOS, in modern history, according to the common acceptation of the term, denote the professors of the religion of the bramins or brachmans, who inhabit the country called *Hindostan*, in the East Indies; from the word *stan*, a "region," and *hind* or *hindoo*; which Ferishteh, as we learn from colonel Dow's translation of his history, supposes to have been a son of Ham the son of Noah. It is observed, however, that Hindoo is not the name by which the inhabitants originally styled themselves; but according to the idiom of the *schanfrit* which they use, *jumbodeep*, from *jumboo*, a "jackall," an animal common in their country; and *deep*, a large portion of land surrounded by the sea; or *bheriekbunt*, from *khunt*, i. e. "a continent," and *bherrhut*, the name of one of the first Indian rajahs. It is also to be observed, that they have assumed the name of *Hindoos* only since the era of the Tartar government, to distinguish themselves from their conquerors the Mussulmen. The term *Gentoo* or *Gent*, in the Schanfrit dialect, denotes *animal* in general, and in its more confined sense *mankind*, and is never appropriated particularly to such as follow the doctrines of Brhima. These are divided into four great tribes, each of which has its own separate appellation; but they have no common or collective term that comprehends the whole nation under the idea affixed by the Europeans to the word *Gentoo*. Mr Halhed, in the preface to his translation of the Code of Gentoo Laws, conjectures, that the Portuguese, on their first arrival in India, hearing the word frequently in the mouths of the natives, as applied to mankind in general, might adopt it for the domestic appellation of the Indians themselves, or perhaps their bigotry might force from the word *Gentoo* a fanciful allusion to Gentile or Pagan. The *Hindoos*, or *Gentoo*s, vie with the Chinese as to the antiquity of their nation. They reckon the duration of the world by four jogues, or distinct ages: the first is the Sutte jogue, or age of purity, which is said to have lasted about 3,200,000 years; during which the life of man was 100,000 years, and his stature 21 cubits: the second, the Tirtah jogue, or the age in which one-third of mankind were reprobate; which consisted of 2,400,000 years, when men lived to the age of 10,000 years: the third, the Dwapar-jogue, in which half of the human race became depraved; which endured to 600,000 years, when mens lives were reduced to 1000 years: and fourthly, the Collee jogue, in which all mankind were corrupted, or rather diminished, which the word *collee* imports. This is the present era, which they suppose will subsist for 400,000 years, of which near 5000 are

already past; and man's life in this period is limited to 100 years. It is supposed by many authors, that most of the *Gentoo shasters*, or scriptures, were composed about the beginning of the Collee jogue; but an objection occurs against this supposition, viz. that the shasters take no notice of the deluge; to which the bramins reply, that all their scriptures were written before the time of Noah, and the deluge never extended to Hindostan. Nevertheless, it appears from the shasters themselves, that they claim a much higher antiquity than this; instances of which are recited by Mr Halhed.

The doctrine of transmigration is one of the distinguishing tenets of the *Gentoo*s. With regard to this subject, it is their opinion, according to Mr Holwell, that those souls which have attained to a certain degree of purity, either by the innocence of their manners or the severity of their mortifications, are removed to regions of happiness proportioned to their respective merits; but that those who cannot so far surmount the prevalence of bad example, and the powerful degeneracy of the times, as to deserve such a promotion, are condemned to undergo continual punishment in the animation of successive animal forms, until, at the stated period, another renovation of the four jogues shall commence, upon the dissolution of the present. They imagine six different spheres above this earth; the highest of which, called *suttee*, is the residence of Brhima and his particular favourites. This sphere is also the habitation of those men who never uttered a falsehood, and of those women who have voluntarily burned themselves with their husbands; the propriety of which practice is expressly enjoined in the code of the *Gentoo* laws. This code, printed by the East-India Company in 1776, is a very curious collection of *Hindoo* jurisprudence, which was selected by the most experienced pundits or lawyers, from curious originals in the Schanfrit language, who were employed for this purpose from May 1773 to February 1775; afterwards translated into the Persian idiom, and then into the English language by Mr Halhed.

The several institutes contained in this collection are interwoven with the religion of the *Gentoo*s, and revered as of the highest authority. The curious reader will discover an astonishing similarity between the institutes of this code and many of the ordinances of the Jewish law; between the character of the bramins or priests, and the Levites; and between the ceremony of the scape-goat under the Mosaic dispensation, and a *Gentoo* ceremony called the *asbummed juy*, in which a horse answers the purpose of the goat. Many obsolete customs and usages alluded to in many parts of the Old Testament, may also receive illustrations from the institutes of this code. It appears from the code, that the bramins, who are the priests and legislators of the country, have resigned all the secular and executive power into the hands of another cast or tribe; and no bramin has been properly capable of the magistracy since the time of the *suttee jogue*. The only privilege of importance which they have appropriated to themselves, is an exemption from all capital punishment: they may be degraded, branded, imprisoned for life, or sent into perpetual exile; but it is every where expressly ordained, that a bramin shall not be put to death on any account whatsoever.

Genus
flexion,
Genus.

We have already observed, that the Hindoos are divided into four great and original tribes, which, according to the Gentoo theology, proceeded from the four different members of Brhima, the supposed immediate agent of the creation under the spirit of the Almighty. These tribes are the bramins, which proceeded from his mouth, and whose office is to pray, read, and instruct; the Chehteree, which proceed from his arms, whose office is to draw the bow, to fight, and to govern; the Bice, proceeding from the belly or thighs, who are to provide the necessities of life by agriculture and traffic; and the Sooder, from the feet, which are ordained to labour, serve, and travel.

Few Christians, says the translator of the Gentoo code, have expressed themselves with a more becoming reverence of the grand and impartial designs of Providence in all its works, or with a more extensive charity towards all their fellow-creatures of every profession, than the Gentoos. It is indeed an article of faith among the bramins, that God's all merciful power would not have permitted such a number of different religions, if he had not found a pleasure in beholding their varieties.

GENUFLEXION, (of *genū*, "knee," and *flecto* "I bend,") the act of bowing or bending the knee; or rather of kneeling down.

The Jesuit Rosweyd, in his Onomasticon, shows, that genuflexion, or kneeling, has been a very ancient custom in the church, and even under the Old Testament dispensation; and that this practice was observed throughout all the year, excepting on Sundays, and during the time from Easter to Whitsuntide, when kneeling was forbid by the council of Nice.

Others have shown, that the custom of not kneeling on Sundays had obtained from the time of the apostles, as appears from St Irenæus, and Tertullian; and the Ethiopic church, scrupulously attached to the ancient ceremonies, still retains that of not kneeling at divine service. The Russians esteem it an indecent posture to worship God on the knees. Add, that the Jews usually prayed standing. Rosweyd gives the reasons of the prohibition of genuflexion on Sundays, &c. from St Basil, Anastasius, St Justin, &c.

Baronius is of opinion, that genuflexion was not established in the year of Christ 58, from that passage in Acts xx. 36. where St Paul is expressly mentioned to kneel down at prayer; but Saurin shows, that nothing can be thence concluded. The same author remarks, also, that the primitive Christians carried the practice of genuflexion so far, that some of them had worn cavities in the floor where they prayed: and St Jerome relates of St James, that he had contracted a hardness on his knees equal to that of camels.

GENUS, among metaphysicians and logicians, denotes a number of beings which agree in certain general properties common to them all: so that a genus is nothing else but an abstract idea, expressed by some general name or term. See LOGIC and METAPHYSICS.

GENUS, is also used for a character or manner applicable to every thing of a certain nature or condition: in which sense it serves to make capital divisions in divers sciences, as medicine, natural history, &c.

GENUS, in rhetoric. Authors distinguish the art of rhetoric, as also orations or discourses produced

thereby, into three genera or kinds, demonstrative, deliberative, and judiciary. To the demonstrative kind belong panegyrics, genethliacons, epithalamiums, funeral harangues, &c. To the deliberative kind belong persuasions, dissuasions, commendations, &c. To the judiciary kind belong defences and accusations.

GENUS, in medicine. See MEDICINE, under the *Nosology*.

GENUS, in natural history, a subdivision of any class or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters. See BOTANY and ZOOLOGY.

GENUS, in music, by the ancients called *genus melodiae*, is a certain manner of dividing and subdividing the principles of melody; that is, the consonant and dissonant intervals, into their concinnous parts.

The moderns considering the octave as the most perfect of intervals, and that whereon all the concords depend, in the present theory of music, the division of that interval is considered as containing the true division of the whole scale.

But the ancients went to work somewhat differently: the diatessaron, or fourth, was the least interval which they admitted as concord; and therefore they sought first how that might be most conveniently divided; from whence they constituted the diapente and diapasen.

The diatessaron being thus, as it were, the root and foundation of the scale, what they called the *genera*, or kinds, arose from its various divisions; and hence they defined the *genus modulandi* to be the manner of dividing the tetrachord and disposing its four sounds as to succession.

The genera of music were three, the enharmonic, chromatic, and diatonic. The two first were variously subdivided: and even the last, tho' that is commonly reckoned to be without any species, yet different authors have proposed different divisions under that name, without giving any particular names to the species as was done to the other two.

For the characters, &c. of these several genera, see ENHARMONIC, CHROMATIC, and DIATONIC.

GEOCENTRIC, in astronomy, is applied to a planet, or its orbit, to denote it concentric with the earth, or as having the earth for its centre, or the same centre with the earth.

GEOFFRÆA, in botany: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is quinquefid, the fruit an oval plum; the kernel compressed. There is only one species, viz the inermis, or cabbage-bark tree, which is a native of Brasil and Jamaica. The wood of this tree is used in building; but it is chiefly valued for its bark, which is administered as an anthelmintic medicine. From this medical property it is also called the *worm-bark tree*. This bark is of a grey colour externally, but black and furrowed on the inside. It has a mucilaginous and sweetish taste, and a disagreeable smell. It is given in cases of worms, in form of powder, decoction, syrup, and extract. The decoction is preferred; and is made by slowly boiling an ounce of the fresh dried bark in a quart of water, till it assumes

Genus
II
Geoffræa.

Plate
CCXXI.

Geoffrey. fume the colour of Madeira wine. This sweetened is the syrup; evaporated, it forms an extract. It commonly produces some sickness and purging; sometimes violent effects, as vomiting, delirium, and fever. These last are said to be owing to an over-dose, or to drinking cold water; and are relieved by the use of warm-water, castor oil, or a vegetable acid. It should always be begun in small doses. But when properly and cautiously administered, it is said to operate as a very powerful anthelmintic, particularly for the expulsion of the lumbrici, which are a very common cause of disease in the West-India islands; and there it is very frequently employed. But it has we believe been but little used in Britain.

GEOFFREY of **MONMOUTH**, bishop of St Asaph, called by our ancient biographers *Gallofridus Monumetensis*. Leland conjectures that he was educated in a Benedictine convent at Monmouth, where he was born; and that he became a monk of that order. Bale, and after him Pits, call him archdeacon of Monmouth; and it is generally asserted that he was made bishop of St Asaph in the year 1151 or 1152, in the reign of king Stephen. His history was probably finished after the year 1138. It contains a fabulous account of British kings, from the Trojan Brutus to the reign of Cadwallader in the year 690. But Geoffrey, whatever censure he may deserve for his credu-

lity, was not the inventor of the stories he relates. It is a translation from a manuscript written in the British language, and brought to England from Armoria by his friend Gualter, archdeacon of Oxford. But the achievements of king Arthur, Merlin's prophecies, many speeches and letters, were chiefly his own addition. In excuse for this historian, Mr Wharton judiciously observes, that fabulous histories were then the fashion, and popular traditions a recommendation to his book.

GEOFFROY (Stephen Francis), a celebrated physician, botanist, and chemist, born at Paris in 1672. After having finished his studies, he travelled into England, Holland, and Italy. In 1704, he received the degree of doctor of physic at Paris; and at length became professor of chemistry, and physician of the Royal College. He was a member of the Royal Society of London, and of the Academy of Sciences. He wrote, 1. Several very curious Theses in Latin, which were afterwards translated into French. 2. An excellent treatise, intitled *Traictatus de Materia Medica, sive de Medicamentorum simplicium historia, virtute, delectu, et usu*. He died at Paris, in 1731.

GEOGRAPHICAL MILE, the same with the sea-mile; being one minute, or the 60th part of a degree of a great circle on the earth's surface.

G E O G R A P H Y.

GEOGRAPHY (*γεωγραφία*, from *γη* terra, and *γραφω* scribo); the doctrine or knowledge of the earth, both as in itself, and as to its affections; or a description of the terrestrial globe, and particularly of the known and inhabitable parts thereof, with all its different divisions. See **EARTH** and **ASTRONOMY**.

SECT. I. History of the Science.

AT what time the science of geography began first to be studied among mankind is entirely uncertain. It is generally agreed, that the knowledge of it was derived to the Greeks, who first of the European nations cultivated this science, from the Egyptians or Babylonians; but it is impossible to determine which of these two nations had the honour of the invention. Herodotus tells us, that the Greeks first learned the pole, the gnomon, and the 12 divisions of the day, from the Babylonians. By Pliny, and Diogenes Laertius, however, we are told, that Thales of Miletus first found out the passage of the sun from tropic to tropic; which he could not have done without the assistance of a gnomon. He is said to have been the author of two books, the one on the tropic, and the other on the equinox; both of which he probably determined by the gnomon; and by this he was led to the discovery of the four seasons of the year, which are determined by the solstices and equinoxes.

Thales divided the year into 365 days; which was undoubtedly a method discovered by the Egyptians, and communicated by them to him. It is said to have been invented by the second Mercury, surnamed *Trismegistus*, who, according to Eusebius, lived about 50 years after the *Exodus*. Pliny tells us expressly, No 136.

that this discovery was made by observing when the shadow returned to its marks; a clear proof that it was done by the gnomon. Thales also knew the method of determining the height of bodies by the length of their shadows, as appears by his proposing this method for measuring the height of the Egyptian pyramids. Hence many learned men have been of opinion, that as the use of the gnomon was known in Egypt long before the dawn of learning in Greece, the use of the pyramids and obelisks, which to common travellers appeared only to be buildings of magnificence, were in reality as many sun-dials on a very large scale, and built with a design to ascertain the season of the year, by the variation of the length of their shadows: and, in confirmation of this opinion, it was found by M. Chazelles in 1694, that the two sides, both of the larger and smaller pyramids, stood exactly north and south; so that, even at this day, they form true meridian lines.

From the days of Thales, who flourished in the sixth century before Christ, very little seems to have been done towards the establishment of geography for 200 years. During this period, there is only one astronomical observation recorded; namely, that of Meton and Euctemon, who observed the summer solstice at Athens, during the archonship of Apseudes, on the 21st of the Egyptian month Phamenoth, in the morning, being the 27th of June 432 B. C. This observation was made by watching narrowly the shadow of the gnomon, and was done with a design to fix the beginning of their cycle of 19 years.

Timocharis and Arifillus, who began to observe about 295 B. C. seem to have been the first who attempted

Geoffroy, Geographical.

2 Conjecture concerning the use of the Egyptian pyramids and obelisks.

Seasons of the year discovered by Thales.

3 Longitude and latitudes determined.

ory. tempted to fix the longitudes and latitudes of the fixed stars, by considering their distances from the equator. One of their observations gave rise to the discovery of the precession of the equinoxes, which was first observed by Hipparchus about 150 years after; and he made use of Timocharis and Aristillus's method, in order to delineate the parallels of latitude, and the meridians on the surface of the earth; thus laying the foundation of the science of geography as we have it at present.

But though the latitudes and longitudes were thus introduced by Hipparchus, they were not attended to by any of the intermediate astronomers till the days of Ptolemy. Strabo, Vitruvius, and Pliny, have all of them entered into a minute geographical description of the situation of places, according to the length of the shadows of the gnomon, without taking the least notice of the degrees and minutes of longitude and latitude.

The discovery of the longitudes and latitudes immediately laid a foundation for making maps, or delineations of the surface of the earth *in plano*, on a very different plan from what had been attempted before.

Formerly the maps were little more than rude outlines and topographical sketches of different countries. The earliest were those of Sesostris, mentioned by Eustathius; who says, that "this Egyptian king, having traversed great part of the earth, recorded his march in maps, and gave copies of his maps not only to the Egyptians, but to the Scythians, to their great astonishment."—Some have imagined, that the Jews made a map of the Holy Land, when they gave the different portions to the nine tribes at Shiloh: for Joshua tells us, that they were sent to walk through the land, and that they *described it in seven parts in a book*; and Josephus tells us, that when Joshua sent out people from the different tribes to measure the land, he gave them, as companions, persons well skilled in geometry, who could not be mistaken in the truth.

The first Grecian map on record is that of Anaximander, mentioned by Strabo, lib. i. p. 7. It has been conjectured by some, that this was a general map of the then known world, and is imagined to be the one referred to by Hipparchus under the designation of the *ancient map*. Herodotus minutely describes a map made by Aristagoras tyrant of Miletus, which will serve to give us some idea of the maps of those ages. He tells us, that Aristagoras showed it to Cleomenes king of Sparta, with a view of inducing him to attack the king of Persia, even in his palace at Susa, in order to restore the Ionians to their ancient liberty. It was traced upon brass or copper, and contained the intermediate countries which were to be traversed in that march. Herodotus tells us, that it contained "the whole circumference of the earth, the whole sea or ocean, and all the rivers:" but these words must not be understood literally. From the state of geography at that time, it may be fairly concluded that by the *sea* was meant no more than the Mediterranean; and therefore, the earth or land signified the coasts of that sea, and more particularly the Lesser Asia, extending towards the middle of Persia. The rivers were the Halys, the Euphrates, and Tigris, which Herodotus mentions as necessary to be crossed in that expedition. It contained one straight line, called the *Royal High-*

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way, which took in all the stations or places of encampment from Sardis to Susa. Of these there were 111 in the whole journey, containing 13,500 stadia, or 1687½ Roman miles of 5000 feet each.

These itinerary maps of the places of encampment were indispensably necessary in all armies. Athenæus quotes Bæton as author of a work intitled, *The encampments of Alexander's march*; and likewise Amyntas to the same purpose. Pliny tells us, that Diogenetus and Bæton were the surveyors of Alexander's marches, and then quotes the exact number of miles according to their mensuration; which he afterwards confirms by the letters of Alexander himself. It likewise appears, that Alexander was very careful in examining the measures of his surveyors, and took care to employ the most skilful in every country for this purpose. The same author also acquaints us, that a copy of this great monarch's surveys was given by Xenocles his treasurer to Patrocles the geographer, who, as Pliny informs us, was admiral of the fleets of Seleucus and Antiochus. His book on geography is often quoted both by Strabo and Pliny; and it appears, that this author furnished Eratosthenes with the principal materials for constructing his map of the oriental part of the world.

Eratosthenes was the first who attempted to reduce geography to a regular system, and introduced a regular parallel of latitude. This was traced over certain places where the longest day was of the same length. He began it from the straits of Gibraltar; and it thence passed through the Sicilian sea, and near the southern extremities of Peloponnesus. From thence it was continued through the Island of Rhodes and the Bay of Issus; and there entering Cilicia, and crossing the rivers Euphrates and Tigris, it was extended to the mountains of India. By means of this line, he endeavoured to rectify the errors of the ancient map, supposed to be that of Anaximander. In drawing this parallel, he was regulated by observing where the longest day was fourteen hours and an half, which Hipparchus afterwards determined to be the latitude of 36 degrees.

The first parallel through Rhodes was ever afterwards considered with a degree of preference, like the foundation stone of all ancient maps; and the longitude of the then known world was often attempted to be measured in stadia and miles, according to the extent of that line, by many succeeding geographers. Eratosthenes soon after attempted not only to draw other parallels of latitude, but also to trace a meridian at right angles to these, passing through Rhodes and Alexandria, down to Syene and Meroë; and as the progress he thus made tended naturally to enlarge his ideas, he at last undertook a still more arduous task, namely, to determine the circumference of the globe, by an actual measurement of a segment of one of its great circles. To find the measure of the earth is indeed a problem which has probably engaged the attention of astronomers and geographers ever since the globular figure of it was known. Anaximander is said to have been the first among the Greeks who wrote upon this subject. Archytas of Tarentum, a Pythagorean, famous for his skill in mathematics and mechanics, is said also to have made some attempts in this way; and Dr Long conjectures, that these are

History.

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History.

7
Most ancient opinions on this subject.

8
Method used by Eratosthenes.

9
By Posidonius.

the authors of the most ancient opinion that the circumference of the earth is 400,000 stadia. Aristarchus of Samos is thought to have considered the magnitude of the earth as well as of the sun and moon. Archimedes makes mention of the ancients who held the circumference of the earth to be 30,000 stadia; but it does not appear what methods were made use of by these very ancient geographers to solve the problem. Probably they attempted it by observations of stars in the zenith or in the horizon; and actual measurement from some part of the circumference of the earth. A proof of this we have from what Aristotle writes in his treatise *De Celo*; that we have different stars pass through our zenith, according as our situation is more or less northerly; and that in the southern parts of the earth we have stars come above our horizon, which if we go northward will no longer be visible to us. Hence it appears, that there are two ways of measuring the circumference of the earth; one by observing stars which pass through the zenith of one place, and do not pass through that of another; the other, by observing some stars which come above the horizon of one place, and are observed at the same time to be in the horizon of another. Eratosthenes at Alexandria in Egypt made use of the former method. He knew that at the summer solstice the sun was vertical to the inhabitants of Syene, a town on the confines of Ethiopia, under the tropic of Cancer, where they had a well built for that purpose, on the bottom of which the rays of the sun fell perpendicularly the day of the summer solstice: he observed by the shadow of a wire set perpendicularly in an hemispherical basin, how much the sun was on the same day at noon distant from the zenith of Alexandria; and found that distance to be one-50th part of a great circle in the heavens. Supposing then Syene and Alexandria to be under the same meridian, he concluded the distance between them to be the 50th part of a great circle upon the earth; and this distance being by measure 5000 stadia, he concluded the circumference of the earth to be 250,000 stadia; but as this number divided by 360 would give $694\frac{2}{3}$ stadia to a degree, either Eratosthenes himself or some of his followers assigned the round number 700 stadia to a degree; which multiplied by 360, makes the circumference of the earth 252,000 stadia; whence both these measures are given by different authors as that of Eratosthenes.

In the time of Pompey the Great, Posidonius made an attempt to measure the circumference of the earth by the method of horizontal observations. He knew that the star called *Canopus* was but just visible in the horizon of Rhodes, and that at Alexandria its meridian height was the 48th part of a great circle in the heavens, or $7\frac{1}{2}$ deg.; which shows what part of a great circle upon the earth the distance between those places amounts to. Supposing them both to be under the same meridian, and the distance between them to be 5000 stadia, the circumference of the earth will be 240,000 stadia; which is the first measure of Posidonius. According to Strabo, Posidonius made the measure of the earth to be 180,000 stadia, at the rate of 500 stadia to a degree. The reason of this difference is thought to be, that Eratosthenes measured the distance between Rhodes and Alexandria, and found it to be but 3750 stadia: taking this for a 48th part of the

earth's circumference, which is the calculation of Posidonius, the whole circumference will be 180,000 stadia. This measure was received by Marinus of Tyre, and is usually ascribed to Ptolemy. Posidonius's method, however, is found to be exceedingly erroneous, on account of the uncertainty of refraction in the stars which are near the horizon. Cassini remarks, that taking exactly the mean betwixt the last dimensions of Eratosthenes and Posidonius, a degree of a great circle upon the earth will be 600 stadia, and a minute of a degree 10 stadia, which is just a mile and a quarter of the ancient Roman measure and a mile of the modern measure.

Several geographers after the time of Eratosthenes and Posidonius have made use of the different heights of the pole in distant places under the same meridian to find the dimensions of the earth. About the year 800, the khalif Almamun had the distance measured between two places two degrees asunder, and under the same meridian, in the plains of Sinjar near the Red Sea. The result of the matter was, that the mathematicians employed found the degree at one time to consist of 56 miles, at another of $56\frac{1}{2}$, or, as some will have it, $56\frac{1}{3}$ miles.

The next attempt to find the circumference of the earth was in 1525 by Fernelius, a learned French physician. To attain his purpose, he took the height of the pole at Paris, going from thence directly northwards, until he came to the place where the height of the pole was one degree more than at that city. The length of the way was measured by the number of revolutions made by one of the wheels of his carriage; and after proper allowances for the declivities and turnings of the road, he concluded that 68 Italian miles were equal to a degree on the earth.

Snellius, an eminent Dutch mathematician, succeeded Fernelius in his attempts to measure the circumference of the earth. Having taken the heights of the pole at Alcaer and at Bergen-op-zoom, he found the difference to be $1^{\circ} 11' 30''$. He next measured the distance betwixt the parallels of these two places, by taking several stations and forming triangles; by means of which he found the degree to consist of 341,676 Leyden feet. Having measured the distance betwixt the parallels of Alcaer and Leyden, which differ only half a degree in their latitude, the calculation came out 342,120 Leyden feet to a degree. Hence he assigned the round number 342,000 Leyden feet to a degree: which, according to Picard, amounts to 55,021 French toises.

In 1635, Mr Norwood, an Englishman, took the elevations of the pole at London and at York; and having measured the distance betwixt the two parallels, assigned $69\frac{1}{2}$ miles and two poles to a degree; each pole being reckoned $16\frac{1}{2}$ feet.

After the year 1654, Ricciolus made use of several methods to determine the circumference of the earth; from all which he concluded, that one degree contained 64,363 Bologna paces, which are equivalent to 61,650 French toises. The most remarkable attempt, however, was that of the French mathematicians, who employed telescopic sights for the purpose, which had never been done before. These are much the best; as by them the view may be directed to an object at a greater distance, and towards any point with more certainty;

certainty; whence the triangles for measuring distances may be formed with greater accuracy than otherwise can be done. In consequence of this improvement, the fundamental base of their operations was much longer than that made use of by Snellius or Ricciolus. The distance measured was between the parallels of Soudon and Malvoisine; between which the difference of the polar altitude is somewhat more than one degree; and the result of the whole was, that one degree contained 57,060 French toises. As this problem can be the more accurately determined in proportion to the length of the meridian line measured, the members of the Royal Academy prolonged theirs quite across the kingdom of France, measuring it trigonometrically all the way. This work was begun in the year 1683, but was not finished till 1718. They made use of Picard's fundamental base, as being measured with sufficient accuracy; and an account of the whole was published by Cassini in the year 1720. In this work some mistakes were detected in the calculations of Snellius; and it was likewise shown, that there are errors in those of Ricciolus, owing principally to the latter having taken too short a fundamental base, and not having paid sufficient attention to the effects of refraction. Though Snellius, however, had made some mistakes in his calculations, there is no reason to doubt the accuracy of his observations. Holland, by reason of its flatness, is the fittest country in Europe for measuring an arc of the meridian; and Snellius had an uncommon opportunity of observing the exactness of his fundamental base, viz. the distance betwixt one tower at Leyden and another at Souterwode. A frost happened just after the country round Leyden had been overflowed; by which means he was enabled to take two stations upon the ice, the distance between which he carefully measured three times over; and then from these stations he observed the angles which the visual rays pointing at those towers made with the straight line upon the ice. From these considerations professor Muschenbroek was induced to make new calculations and form triangles upon the fundamental base of Snellius, which he did in the year 1700; and from these he assigns 57,033 toises to a degree, which is only 27 less than had been done by the academicians.

The investigation of this problem of the circumference of the earth was essentially necessary for determining the radical principles of all maps; that of Eratosthenes, though the best of which antiquity can boast, was nevertheless exceedingly imperfect and inaccurate. It contained little more than the states of Greece, and the dominions of the successors of Alexander, digested according to the surveys above mentioned. He had seen, indeed, and has quoted, the voyages of Pytheas into the great Atlantic ocean, which gave him some faint idea of the western parts of Europe; but so imperfect, that they could not be realised into the outlines of a chart. Strabo tells us, that he was extremely ignorant of Gaul, Spain, Germany, and Britain. He was equally ignorant of Italy, the coasts of the Adriatic, Pontus, and all the countries towards the north. We are also told by the same author, that Eratosthenes made the distance between Epidamnus or Dyrrhachium on the Adriatic, and the bay of Thermæ on the Ægean sea, to be only 900 stadia, when in rea-

lity it was above 2000; and in another instance, he had enlarged the distance from Carthage to Alexandria to 15,000 stadia, when in reality it was no more than 9000.

Such was the state of geography and the nature of the maps prior to the time of Hipparchus; who made a closer connection between geography and astronomy, by determining the longitudes and latitudes from celestial observations. It must be owned, however, that the previous steps to this new projection of the sphere had been in a great measure made easy by Archimedes, upwards of 50 years before the time of Hipparchus, when he invented his noble theorems for measuring the surface of a sphere and its different segments.

It appears that war has been generally the occasion of making the most accurate maps of different countries; and therefore geography made great advances from the progress of the Roman arms. In all the provinces occupied by that people, we find that camps were every where constructed at proper intervals, and roads were raised with substantial materials, for making an easier communication between them; and thus civilization and surveying were carried on according to system throughout the extent of that large empire. Every new war produced a new survey and itinerary of the countries where the scenes of action passed; so that the materials of geography were accumulated by every additional conquest. Polybius tells us, that at the beginning of the second Punic war, when Hannibal was preparing his expedition against Rome, the countries through which he was to pass were carefully measured by the Romans. Julius Cæsar caused a general survey of the Roman empire to be made, by a decree of the senate. Three surveyors, Zenodorus, Theodotus, and Polyclitus, had this task assigned them, and are said to have completed it in 25 years. The Roman itineraries that are still extant, also show what care and pains they had been at in making surveys in all the different provinces of their empire; and Pliny has filled the third, fourth, and fifth books of his Natural History with the geographical distances that were thus measured. We have likewise another set of maps still preserved to us, known by the name of the *Peutingerian Tables*, published by Welfer and Bertius, which give a sufficient specimen of what Vegetius calls the *Itinera Picta*, for the clearer direction of their armies in their march.

The Roman empire had been enlarged to its greatest extent, and all its provinces well known and surveyed, when Ptolemy, in the reign of Antoninus Pius, about 150 years after Christ, composed his system of geography. The principal materials he made use of for composing this work, were the proportions of the *gnomon to its shadow*, taken by different astronomers at the times of the equinoxes and solstices; calculations founded upon the length of the longest days; the measures or computed distances of the principal roads contained in their surveys and itineraries; and the various reports of travellers and navigators, who often determined the distances of places by hearsay and conjecture. All these were compared together, and digested into one uniform body or system; and afterwards were translated by him into a new mathematical language, expressing the different degrees of longitude and latitude, according to the invention of

History.

Hipparchus, but which Ptolemy had the merit of carrying into full practice and execution, after it had been neglected for upwards of 250 years. With such imperfect and inaccurate materials, it is no wonder to find many errors in Ptolemy's system. Neither were these errors such as had been introduced in the more distant extremities of his maps, but even in the very centre of that part of the world which was the best known to the ancient Greeks and Romans, and where all the famed ancient astronomers had made their observations.—Yet this system, with all its imperfections, continued in vogue till the beginning of the present century. The improvements in geography which at that time, and since, have taken place, were owing to the great progress made in astronomy by several eminent men who lived during that period. More correct methods and instruments for observing the latitude were found out; and the discovery of Jupiter's satellites afforded a much easier method of finding the longitudes than was formerly known. The voyages made by different nations also, which were now become much more frequent than formerly, brought to the knowledge of the Europeans a vast number of countries utterly unknown to them before. The late voyages of Captain Cooke, made by order of his Britannic Majesty, have contributed more to the improvement of geography than any thing that has been done during the present century; so that now the geography of the utmost extremities of the earth is in a fair way of being much better known to the moderns than that of the most adjacent countries was to the ancients. This, however, must be understood only of the sea-coasts of these countries; for, as to their internal geography, it is less known now than before, except in a very few places.

17
Geography
still imper-
fect.

On the whole, it may be observed, that geography is a science even yet far from perfection. The maps of America and the eastern parts of Asia are, perhaps, more unfinished than any of the rest. Even the maps of Great Britain and Ireland are very imperfect and unsatisfactory; and the numbers we have of them, varied, and republished, without any real improvement, justly confirm an observation made by Lord Bacon, namely, that an opinion of plenty is one of the causes of want. The late Dr Bradley was of opinion, that there were but two places in England whose longitude might be depended upon as accurately taken; and that these were the observatory at Greenwich, and Serburn-castle the seat of the earl of Macclesfield in Oxfordshire; and that their distance was one degree in space, or four minutes in time. Even this was found to be inaccurate, the distance in time being observed by the late transit of Venus to be only three minutes and 47 seconds. It were well, however, if there were no greater errors with regard to other places; but if we examine the longitude of the Lizard, we shall find scarce any two geographers that agree concerning it; some making it $4^{\circ} 40'$ from London; others 5° , and $5^{\circ} 14'$; while some enlarge it to 6° . Our best maps are therefore still to be considered as unfinished works, where there will always be many things to be added and corrected, as different people have an opportunity.

SECT. II. Principles and Practice of Geography.

THE fundamental principles of geography are, the spherical figure of the earth; its rotation on its axis; its revolution round the sun; and the position of the axis or line round which it revolves, with regard to the celestial luminaries. That the earth and sea taken together constitute one vast sphere, is demonstrable by the following arguments. 1. To people at sea, the land disappears, though near enough to be visible were it not for the intervening convexity of the water. 2. The higher the eye is placed, the more extensive is the prospect; whence it is common for sailors to climb up to the tops of the masts to discover land or ships at a distance. But this would give them no advantage were it not for the convexity of the earth; for, upon an infinitely extended plane objects would be visible at the same distance whether the eye were high or low; nor would any of them vanish till the angle under which they appeared became too small to be perceptible. 3. To people on shore, the mast of a ship at sea appears before the hull; but were the earth an infinite plane, not the highest objects, but the biggest, would be longest visible; and the mast of a ship would disappear by reason of the smallness of its angle long before the hull did so. 4. The convexity of any piece of still water of a mile or two extent may be perceived by the eye. A little boat, for instance, may be perceived by a man who is any height above the water; but if he stoops down and lays his eye near the surface, he will find that the fluid appears to rise and intercept the view of the boat entirely. 5. The earth has been often sailed round; as by Magellan, Drake, Dampier, Anson, Cook, and many other navigators; which demonstrates that the surface of the ocean is spherical; and that the land is very little different, may easily be proved from the small elevation of any part of it above the surface of the water. The mouths of rivers which run 1000 miles are not more than one mile below their sources; and the highest mountains are not quite four miles of perpendicular height: so that, though some parts of the land are elevated into hills, and others depressed into valleys, the whole may still be accounted spherical. 6. An undeniable and indeed ocular demonstration of the spherical figure of the earth is taken from the round figure of its shadow which falls upon the moon in the time of eclipses. As various sides of the earth are turned towards the sun during the time of different phenomena of this kind, and the shadow in all cases appears circular, it is impossible to suppose the figure of the earth to be any other than spherical. The inequalities of its surface have no effect upon the earth's shadow on the moon; for as the diameter of the terraqueous globe is very little less than 8000 miles, and the height of the highest mountain on earth not quite four, we cannot account the latter any more than the 2000th part of the former; so that the mountains bear no more proportion to the bulk of the earth, than grains of dust bear to that of a common globe.

A great many of the terrestrial phenomena depend upon the globular figure of the earth, and the position of its axis with regard to the sun; particularly the

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rising and setting of the celestial luminaries, the length of the days and nights, &c. A general explanation of these is given under the article *ASTRONOMY*; but still it belongs to geography to take notice of the difference betwixt the same phenomena in different parts of the earth. Thus, though the sun rises and sets all over the world, the circumstances of his doing so are very different in different countries. The most remarkable of these circumstances is the duration of the light not only of the sun himself, but of the twilight before he rises and after he sets. In the equatorial regions, for instance, darkness comes on very soon after sunset; because the convexity of the earth comes quickly in between the eye of the observer and the luminary, the motion of the earth being much more rapid there than any where else. In our climate the twilight always continues two hours or thereabouts, and during the summer-season it continues in a considerable degree during the whole night. In countries farther to the northward or southward, the twilight becomes brighter and brighter as we approach the poles, until at last the sun does not appear to touch the horizon, but goes in a circle at some distance above it for many days successively. In like manner, during the winter, the same luminary sinks lower and lower, until at last he does not appear at all; and there is only a dim twinkling of twilight for an hour or two in the middle of the day. By reason of the refraction of the atmosphere, however, the time of darkness, even in the most inhospitable climates, is always less than that of light; and so remarkable is the effect of this property, that in the year 1682, when some Dutch navigators wintered in Nova Zembla, the sun was visible to them 16 days before he could have been seen above the horizon had there been no atmosphere, or had it not been endowed with any such power. The reason of all this is, that in the northern and southern regions only a small part of the convexity of the globe is interposed betwixt us and the sun for many days, and in the high latitudes none at all. In the warmer climates the sun has often a beautiful appearance at rising and setting, by reason of the refraction of his light through the vapours which are copiously raised in those parts. In the colder regions, halos, parhelia, aurora borealis, and other meteors, are frequent; the two former owing to the great quantity of vapour continually flying from the warm regions of the equator to the colder ones of the poles. The aurora borealis is owing to the electrical matter imbibed by the earth from the sun in the warm climates, and going off through the upper regions of the atmosphere to the place from whence it came. In the high northern latitudes, thunder and lightning are unknown, or but seldom heard of; but the more terrible phenomena of earthquakes, volcanoes, &c. are by no means unfrequent. These, however, seem only to affect islands and the maritime parts of the continent. See the articles *EARTHQUAKE* and *VOLCANO*.

Notwithstanding the seeming inequality in the distribution of light and darkness, however, it is certain, that throughout the whole world there is nearly an equal proportion of light diffused on every part, abstracting from what is absorbed by clouds, vapours, and the atmosphere itself. The equatorial regions have indeed the most intense light during the day,

but the nights are long and dark; while, on the other hand, in the northerly and southerly parts, though the sun shines less powerfully, yet the length of time that he appears above the horizon, with the greater duration of the twilight, makes up for the seeming deficiency.

Were the earth a perfect plane, the sun would appear to be vertical in every part of it: For in comparison with the immense magnitude of that luminary, the diameter of this globe itself is but very small: and as the sun, were he near to us, would do much more than cover the whole earth; so, though he were removed to any distance, the whole diameter of the latter would make no difference in the apparent angle of his altitude. By means of the globular figure of the earth also, along with the great disparity between the diameters of the two bodies, some advantage is given to the day over the night: for thus the sun, being immensely the larger of the two, shines upon more than one half of the earth; whence the unenlightened part has a shorter way to go before it again receives the benefit of his rays. This difference is greater in the inferior planets Venus and Mercury than the earth.

To the globular figure of the earth likewise is owing the long moon-light which the inhabitants of the polar regions enjoy, the general reason of which is given under the article *ASTRONOMY*, n° 373. The same thing likewise occasions the appearance and disappearance of certain stars at some seasons of the year in some countries; for were the earth flat, they would all be visible in every part of the world at the same time. Hence most probably has arisen the opinion of the influence of certain stars upon the weather and other sublunary matters. In short, on the globular figure of the earth depends the whole present appearance of nature around us; and were the shape of the planet we inhabit to be altered to any other, besides the real differences which would of consequence take place, the *apparent* ones would be so great that we cannot form any idea of the face which nature would then present to us.

In geography the circles which the sun apparently describes in the heavens are supposed to be extended as far as the earth, and marked on its surface; and in like manner we may imagine as many circles as we please to be described on the earth, and their planes to be extended to the celestial sphere, till they mark concentric ones on the heaven. The most remarkable of those supposed by geographers to be described in this manner are the following.

1. *The Horizon*. This is properly a double circle, one of the horizons being called the *sensible*, and the other the *rational*. The former comprehends only that space which we can see around us upon any part of the earth; and which is very different according to the difference of our situation. The other, called the *rational*, is a circle parallel to the former, and passing through the centre of the earth supposed to be continued as far as the celestial sphere itself. To the eyes of spectators, there is always a vast difference between the sensible and rational horizons; but by reason of the immense disparity betwixt the size of the earth and celestial sphere, planes of both circles may be considered as coincident. Hence, in geography, when the horizon, or plane of the horizon is spoken of, the *rational*

20
Circles supposed to be drawn on the earth's surface.

21
Horizons.

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22
Vertical
circles or
azimuths.

23
Exact method of observing the altitudes of the sun or moon.

24
Almucantars.

25
Apparent distances of celestial bodies how measured.

26
Sensible horizon defined.

tional is always understood, when nothing is said to the contrary. By reason of the round figure of the earth, every part has a different horizon. The poles of the horizon, that is, the points directly above the head, and opposite to the feet of the observer, are called the *zenith* and *nadir*.

2. A great circle described upon the sphere of the heaven, and passing through the two vertical points, is called a *vertical circle*, or an *azimuth*; and of these we may suppose as many as we please all round the horizon. Sometimes they are also called *secondaries* of the horizon; and in general any great circle, drawn through the poles of another, is called its *secondary*. In geography every circle obtains the epithet of *great* whose plane passes through the centre of the earth; in other cases they are called *lesser circles*. The altitudes of the heavenly bodies are measured by an arch of the azimuth or vertical circle intercepted between the horizon and the body itself. The method of taking them is explained under the article ASTRONOMY, n^o 379; but a more accurate method with regard to the sun and moon, is for two persons to make their observations at the same time; one of them to observe the altitude of the upper limb, the other of the lower limb of the luminary; the mean betwixt these two giving the true height of the centre. The same thing may also be done accurately by one observer, having the apparent diameter of the luminary given. For, having found the height of the upper edge of the limb by the quadrant, take from it half his diameter, the remainder is the height of his centre; or having found the altitude of his lower edge, add to it half the diameter, and the sum is the height of the centre as before. When the observations are made with a large instrument, it will be convenient to use a sextant, or sixth part of a circle, rather than a quadrant, as being less unwieldy.

3. *Almucantars* are circles supposed to be drawn upon the sphere parallel to the horizon, and grow less and less as they approach the vertical points, where they entirely vanish. The apparent distances betwixt any two celestial bodies are measured by supposing arches of great circles drawn through them, and then finding how many degrees, minutes, &c. of these circles are intercepted between them. The apparent diameter of the sun's disk is found by a circle of distance drawn through the centre of it; and the number of minutes continued between the two opposite points of that part of the circle which passes through the centre is the measure of the apparent diameter. The apparent diameter of the sun may be found by two observers, one taking the altitude of the upper, and the other of the lower edge of the limb; the difference betwixt the two being the diameter required; or,

4. Sometimes the visible horizon is considered only with regard to the objects which are upon the earth itself; in which case we may define it to be a lesser circle on the surface of the earth, comprehending all such objects as are at once visible to us; and the higher the eye, the more is the visible horizon extended. It is most accurately observed, however, on the sea; on account of the absence of those inequalities which at land render the circle irregular; and for this reason it is called sometimes the horizon of the sea; and may be observed by looking through the sights of a quadrant at the most distant part of the sea then visible.

In making this observation, the visual rays AD and AE, fig. 2. will, by reason of the spherical surface of the sea, always point a little below the true sensible horizon SS; and consequently below the rational horizon which is parallel to it, and supposed to be coincident with it. The quadrant shows the depression of the horizon of the sea below the true horizon; and it is obvious from the figure, that the higher the eye is, the greater must this depression be. The depression of the horizon of the sea, however, is not always the same, even though there be no variation in the height of the eye. The difference indeed is but small, amounting only to a few seconds, and is owing to a difference in the atmosphere, which sometimes refracts more than at others. Without refraction, the visual ray would be AE, and in that case E is the most distant point which could be seen; but by refraction, the ray FG, coming from the point G, may be seen at F, so as to go on from thence in the line FA; and then the view is extended as far as G, and the depression of the horizon of the sea is in the line AF, which points higher than AE, but extends the view farther. From an inspection of the figure it is evident, that if the refraction were greater, the view would be extended still farther, as to M; though the depression of the horizon of the sea would then be less, as is shown by the line ALM: whence also it appears, that by reason of the difference of refraction in the air, our horizon is sometimes more extensive than at others.

5. The *equator* is a great circle upon the earth, every part of which is equally distant from the poles or extremities of the imaginary line on which the earth revolves. In the sea-language it is usually called the *line*, and when people sail over it they are said to cross the line.

6. The *meridian* of any place is a great circle on the earth drawn through that place and both poles of the earth. It cuts the horizon at right angles, marking upon it the true north and south points; dividing also the globe into two hemispheres called the *eastern* and *western* from their relative situation to that place and to one another. The poles divide the meridians into two semicircles; one of which is drawn through the place to which the meridian belongs, the other through that point of the earth which is opposite to the place. By the meridian of a place geographers and astronomers often mean that semicircle which passes through the place; and which may therefore be called the *geographical meridian*. All places lying under this semicircle are said to have the same meridian; the semicircle opposite to this is called the *opposite meridian*. The meridians are thus immovably fixed to the earth as much as the places themselves on its surface; and are carried along with it in its diurnal rotation. When the geographical meridian of any place is, by the rotation of the earth, brought to point at the sun, it is noon or mid-day at that place; in which case, were the plane of the circle extended, it would pass through the middle of the luminary's disk. Supposing the plane of the meridians to be extended to the sphere of the fixed stars, in that case, when by the rotation of the earth the meridian comes to any point in the heavens, then, from the apparent motion of the heavens, that point is said to come to the meridian. The rotation of the earth is from west to east; whence the celestial bodies appear to move the contrary

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CCXI.

27
Depression of the horizon of the sea.

28
Equator.

29
Meridians.

Principles and Practice. 30 true east and west points. 31 longitude and first meridian.

trary way. East and west, however, are terms merely relative; since a place may be west from one part of the earth, and east from another; but the true east and west points from any place are those where its horizon cuts the equator.

7. All places lying under the same meridian are said to have the same *longitude*, and those which lie under different meridians to have different longitudes; the difference of longitude being reckoned eastward or westward on the equator. Thus if the meridian of any place cuts the equator in a point 15 degrees distant from another, we say there is a difference of 15° longitude betwixt these two places. Geographers usually pitch upon the meridian of some remarkable place for the first meridian; and reckon the longitude of all others by the distance of their meridians from that which they have pitched upon as the first; measuring sometimes eastward on the equator all round the globe, or sometimes only one half east and the other west; according to which last measurement, no place can have more than 180° longitude either east or west. By the ancient Greek geographers the first meridian was placed in *Hera* or *Junonia*, one of the *Fortunate Islands* as they were then called; which is supposed to be the present island of *Teneriffe*, one of the *Canaries*. These islands being the most westerly part of the earth then known, were on that account made the seat of the first meridian, the longitude of all other places being counted eastward from them. The Arabians, ambitious of having the first meridian taken from them, fixed it at the most westerly part of the continent of Africa. Some later geographers placed the first meridian in the island of *Corvo*, one of the *Azores* (A); because at that time the magnetic needle on the island just mentioned pointed due north without any variation; and it was not then known that the needle itself was subject to variation, as has since been discovered. *Bleau* replaced the first meridian in the isle of *Teneriffe*; and to ascertain the place more exactly, caused it to pass through the famous mountain of that island, called the *peak* from *el-pico*, "a bird's beak." Among modern geographers, however, it is now become customary for each to make the first meridian pass through the capital of his own country; a practice, however, which is certainly improper, as it is thus impossible for the geographers of one nation to understand the maps of another without a troublesome calculation, which answers no purpose. By the British geographers the royal observatory at *Greenwich* is accounted the place of the first meridian.

32 four circles.

8. If we suppose 12 great circles, one of which is the meridian to a given place, to intersect each other at the poles of the earth, and divide the equator into 24 equal parts, these are the *hour-circles* of that place. These are by the poles divided into 24 semicircles, corresponding to the 24 hours of the day and night. The distance betwixt each two of these semicircles is 15°, being the 24th part of 360; and by the rotation of the earth, each succeeding semicircle points at the sun one hour after the preceding; so that in 24 hours all the semicircles point successively at the sun. Hence

it appears that such as have their meridian 15° east from any other, have likewise noon one hour sooner, and the contrary; and in like manner every other hour of the natural day is an hour sooner at the one place than at the other. Hence, from any instantaneous appearance in the heavens observed at two distant places, the difference of longitude may be found, if the hour of the day be known at each place. Thus the beginning of an eclipse of the moon, when the luminary first touches the shadow of the earth, is an instantaneous appearance, as also the end of an eclipse of this kind when the moon leaves the shadow of the earth, visible to all the inhabitants on that side of the globe. If therefore we find, that at any place an eclipse of the moon begins an hour sooner than at another, we conclude that there is a difference of 15° of longitude between the two places. Hence also were a man to travel or sail round the earth from west to east, he will reckon one day more to have passed than they do who stay at the place from whence he set out; so that their Monday will be his Tuesday, &c. On the other hand, if he sails westward, he will reckon a day less, or be one day in the week later, than those he leaves behind.

9. The equator divides the earth into two hemispheres called the *northern* and *southern*: all places lying under the equator are said to have no latitude; and all others to have north or south latitude according to their situation with respect to the equator. The *latitude* itself is the distance from the equator measured upon the meridian, in degrees, minutes, and seconds. The complement of latitude is the difference between the latitude itself and 90°, or as much as the place itself is distant from the pole; and this complement is always equal to the elevation of the equator above the horizon of the place. The elevation of the pole of any place is equal to the latitude itself.

33 Of the latitude.

34 Of a parallel sphere.

An inhabitant of the earth who lives at either of the poles, has always one of the celestial poles in his zenith and the other in his nadir, the equator coinciding with the horizon: hence all the celestial parallels are also parallel to the horizon; whence the person is said to live in a parallel sphere, or to have a parallel horizon.

35 Right sphere.

Those who live under the equator have both poles in the horizon, all the celestial parallels cutting the horizon at right angles; whence they are said to live in a right sphere, or to have a right horizon.

36 Oblique sphere.

Lastly, those who live between either of the poles and the equator are said to live in an oblique sphere, or to have an oblique horizon; because the celestial equator cuts his horizon obliquely, and all the parallels in the celestial sphere have their planes oblique to that of the horizon. In this sphere some of the parallels intersect the horizon at oblique angles, some are entirely above it, and some entirely below it; all of them, however, so situated, that they would obliquely intersect the plane of the horizon extended.

37 Arctic and circle.

The largest parallel which appears entire above the horizon of any place in north latitude is called by the ancient astronomers the *arctic circle* of that place; within

(A) These islands had their name from the number of goshawks found there; the word *azor* in Spanish signifying a "goshawk."

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within this circle, *i. e.* between it and the arctic pole, are comprehended all the stars which never set in that place, but are carried perpetually round the horizon in circles parallel to the equator. The largest parallel which is hid entire below the horizon of any place in north latitude was called the *antarctic circle* of that place by the ancients. This circle comprehends all the stars which never rise in that place, but are carried perpetually round below the horizon in circles parallel to the equator. In a parallel sphere, however, the equator may be considered as both *arctic* and *antarctic* circle; for being coincident with the horizon, all the parallels on one side are entirely above it, and those on the other entirely below it. In an oblique sphere, the nearer any place is to either of the poles, the larger are the arctic and antarctic circles, as being nearer to the celestial equator, which is a great circle. In a right sphere, the arctic and antarctic circles have no place; because no parallel appears either entirely above or below it. By the arctic and antarctic circles, however, modern geographers in general understand two fixed circles at the distance of $23\frac{1}{2}$ degrees from the pole. These are supposed to be described by the poles of the ecliptic, and mark out the space all round the globe where the sun appears to touch the horizon at midnight in the summer time, and to be entirely sunk below it in the winter. These are also called the *polar circles*. By the ancients the arctic circle was called *maximus semper apparentium*, and *circulus perpetuæ apparitionis*; the antarctic circle, on the other hand, being named *maximus semper occultorum*, and *circulus perpetuæ occultationis*.

38
Appear-
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the inhabi-
tants of a pa-
rallel, right,
and oblique
sphere.

According to the different positions of the globe with regard to the sun, the celestial bodies will exhibit different phenomena to the inhabitants. Thus, in a parallel sphere, they will appear to move in circles round the horizon; in a right sphere, they would appear to rise and set as at present, but always in circles cutting the horizon at right angles; but in an oblique sphere, the angle varies according to the degree of obliquity, and the position of the axis of the sphere with regard to the sun. The phenomena thence arising will be sufficiently understood from what is said under the article ASTRONOMY, n° 345, &c. From thence we will easily perceive the reason of the sun's continual change of place in the heavens: but though it is certain that this change takes place every moment, the vast distance of the luminary renders it imperceptible for some time, unless to very nice astronomical observers. Hence we may generally suppose the place of the sun to be the same for a day or two together, tho' in a considerable number of days it becomes exceedingly obvious to every body. When he appears in the celestial equator, his motion appears for some time to be in the plane of that circle, though it is certain that his place there is only for a single moment; and in like manner, when he comes to any other point of the heavens, his apparent diurnal motion is in a parallel drawn throughout. Twice a-year he is in the equator, and then the days and nights are nearly equal all over the earth. This happens in the months of March and September; after which the sun proceeding either northward or south, according to the season of the year and the position of the observer, the days become longer or shorter than the nights, and

N° 136.

summer or winter come on, as is fully explained under the article ASTRONOMY. The secession of the sun from the equator either northward or southward is called his *declination*, and is either north or south according to the season of the year; and when this declination is at its greatest height, he is then said to be in the tropic, because he begins to turn back (the word *tropic* being derived from the Greek *τροπήν* *verto*). The space between the two tropics, called the *torrid zone*, extends for no less than 47 degrees of latitude all round the globe; and throughout the whole of that space the sun is vertical to some of the inhabitants twice a-year, but to those who live directly under the tropics only once. Throughout the whole torrid zone also there is little difference between the length of the days and nights. The ancient geographers found themselves considerably embarrassed in their attempts to fix the northern tropic; for though they took a very proper method, namely, to observe the most northerly place where objects had no shadow on a certain day, yet they found that on the same day no shadow was cast for a space of no less than 300 stadia. The reason of this was, the apparent diameter of the sun; which being about half a degree, seemed to extend himself over as much of the surface of the earth, and to be vertical every where within that space.

When the sun is in or near the equator, he seems to change his place in the heavens most rapidly; so that about the equinoxes one may very easily perceive the difference in a day or two: but as he approaches the tropics this apparent change becomes gradually slower; so that for a number of days he scarce seems to move at all. The reason of this may easily be understood from any map on which the ecliptic is delineated: for by drawing lines through every degree of it parallel to the equator, we shall perceive them gradually approach nearer and nearer each other, until at last, when we approach the point of contact betwixt the ecliptic and tropic, they can for several degrees scarce be distinguished at all.

From an observation of the diversity in the length of the days and nights, the rising and setting of the sun, with the other phenomena already mentioned, the ancient geographers divided the surface of the earth into certain districts, which they called *climates*; and instead of the method of describing the situation of places by their latitude and longitude as we do now, they contented themselves with mentioning the climate in which they were situated. When more accuracy was required, they mentioned also the beginning, middle, and ending of the climates. This distinction, however, was certainly very vague and inaccurate: for the only method they had of determining the difference was by the length of the day; and a climate, according to them, was such a space as had the day in its most northerly part half an hour longer than in the most southerly. For the beginning of their first climate they took that parallel under which the day is twelve hours and three quarters long, those parts of the world which lie nearer the equator not being supposed to be in any climate; either because in a loose sense they may be considered as in a right sphere, or because they were unknown, or thought to be uninhabitable by reason of the heat. The northern climates were generally supposed to be seven; which must

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39
Sun's decli-
nation.

40
Of the tropics, &c.

41
Division of
the earth's
surface in-
to climates

have an equal number of southern climates corresponding with them. The names of the northern climates, according to the ancients, were as follow: 1. Meroe. 2. Syene in Egypt. 3. Alexandria in Egypt. 4. Rhodes. 5. Rome; or, according to others, a parallel drawn through the Hellespont. 6. The parallel passing through the mouth of the river Boristhenes. 7. The Riphean mountains.—Each of these places was supposed to be in the middle of the climate; and as the southern parts of the globe were then very little known, the climates to the southward of the equator were supposed to be as far distant from that circle as the northern ones; in consequence of which they took their names from the latter.

A parallel was said to pass through the middle of a climate when the day under that parallel is a quarter of an hour longer than that which passes through the most southerly part. Hence it does not divide the space into two equal parts, but that part next the equator will always be the larger of the two; because the farther we recede from that circle, the less increase of latitude will be sufficient to lengthen the day a quarter of an hour. Thus, in every climate there are three parallels; one marking the beginning, the second the middle, and the third the ending of the climate; the ending of one being always the beginning of another. Some of the ancients divided the earth by these parallels; others by a parallel did not mean a mere line, but a space of some breadth: and hence the parallel may be understood as the same with half a climate.

This method of dividing the surface of the earth into climates, though now very much diffused, has been adopted by several modern geographers. Some of these begin their climates at the equator, reckoning them by the increase of half an hour in the length of the day northward. Thus they go on till they come to the polar circles, where the longest day is 24 hours: betwixt these and the poles they count the climates by the increase of a natural day in the length of time that the sun continues above the horizon, until they come to one where the longest day is 15 of ours, or half a month; and from this to the pole they count by the increase of half months or whole months, the climates ending at the poles where the days are six months long. The climates betwixt the equator and the polar circles are called *hour-climates*, and those between the polar circles and the poles are called *month-climates*.—In common language, however, we take the word *climate* in a very different sense; so that, when two countries are said to be in different climates, we understand only that the temperature of the air, seasons, &c. are different.

From the difference in the length and positions of the shadows of terrestrial substances, ancient geographers have given different terms to the inhabitants of certain places of the earth; the reason of which will be easily understood from the following considerations. 1. Since the sun in his apparent annual revolution never removes farther from the equator than $23\frac{1}{2}$ degrees, it follows, that none of those who live without that space, or beyond the tropics, can have the luminary vertical to them at any season of the year. 2. All who live between the tropics have the sun vertical twice a-year, though not all at the same time.

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Thus, to those who live directly under the equator, he is directly vertical in March and September at the time of the equinox. If a place is in 10° north latitude, the sun is vertical when he has 10° north declination; and so of every other place. 3. All who live between the tropics have the sun at noon sometimes north and sometimes south of them. Thus, they who live in a place situated in 20° north latitude, have the sun at noon to the northward when he has more than 20 degrees north declination, and to the southward when he has less. 4. Such of the inhabitants of the earth as live without the tropics, if in the northern hemisphere, have the sun at noon to the southward of them, but to the northward if in the southern hemisphere. 5. When the sun is in the zenith of any place, the shadow of a man or any upright object falls directly upon the place where they stand, and consequently is invisible; whence the inhabitants of such places were called *Ascii*, or without shadows: those who live between the tropics, and have the sun sometimes to the north and sometimes to the south of them, have of consequence their shadows projecting north at some seasons of the year and south at others; whence they were called *Araphiscii*, or having two kinds of shadows. They who live without the tropics have their noon shadows always the same way; and are therefore called *Heteroscii*, that is, having only one kind of shadow. If they are in north latitude, the shadows are always turned towards the north; and if in the southern hemisphere, towards the south. When a place is so far distant from the equator that the days are 24 hours long or longer, the inhabitants were called *Periscii*, because their shadows turn round them.

Names have likewise been imposed upon the inhabitants of different parts of the earth from the parallels of latitude under which they live, and their situation with regard to one another. Thus, when two places are so near each other that the inhabitants have only one horizon, or at least that there is no perceptible difference between them, the inhabitants were called *Synaci*, that is, near neighbours; the seasons, days, nights, &c. in both places being perfectly alike. Those who lived at distant places, but under the same parallel, were called *Periaci*, that is, living in the same circle. Those who are on the same side of the equator have the seasons of the year at the same time; but if on different sides, the summer season of the one is the winter of the other, as is fully explained under the article ASTRONOMY. Some writers, however, by the name of *Periaci*, distinguish those who live under opposite points of the same parallel, where the noon of one is the midnight of the other. When two places lie under parallels equally distant from the equator, but in opposite hemispheres, the inhabitants were called *Antaci*. These have a similar increase of days and nights, and similar seasons, but in opposite months of the year. According to some, the *Antaci* were such as lived under the same geographical meridian, and had day and night at the same time. If two places are in parallels equally distant from the equator, and in opposite meridians, the inhabitants were called *Antichthonos* with respect to one another, that is, living on opposite sides of the earth; or *Antipodes*, that is, having their feet opposite to one another. When two persons are *Antipodes*, the zenith of the one is the

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nadir of the other. They have a like elevation of the pole, but it is of different poles: they have also days and nights alike, and similar seasons of the year; but they have opposite hours of the day and night, as well as seasons of the year. Thus, when it is mid-day with us, it is midnight with our Antipodes; when it is summer with us, it is winter with them, &c.

From the various appearances of the sun, and the effects of his light and heat upon different parts of the earth, the division of it into zones has arisen. These are five in number. 1. The torrid zone, lying between the two tropics for a space of 47° of latitude. This is divided into two equal parts by the equator; and the inhabitants have the sun vertical to them twice a-year, excepting only those who dwell under the tropics, to whom he is vertical only once, as has already been explained. 2. The two temperate zones lie between the polar circles and the tropics, containing a space of 43° of latitude. And, 3. The two frigid zones lie between the polar circles and the poles. In these last the longest day is never below 24 hours, in the temperate zones it is never quite so much, and in the torrid zone it has never above 14. The zones are named from the degree of heat they were supposed to be subjected to. The torrid zone was supposed by the ancients to be uninhabitable by reason of its heat; but this is now found to be a mistake, and many parts of the temperate zones are more intolerable in this respect than the torrid zone itself. Towards the polar circles, also, these zones are intolerably cold during the winter season. Only a small part of the northern frigid zone, and none of the southern, is inhabited. Some geographers reckoned six zones, dividing the torrid zone into two by the equator.

When any parts of the heaven or earth are said to be on the right or left, we are to understand the expression differently according to the profession of the person who makes use of it; because according to that his face is supposed to be turned towards a certain quarter. A geographer is supposed to stand with his face to the north, because the northern part of the world is best known. An astronomer looks towards the south, to observe the celestial bodies as they come to the meridian. The ancient augurs, in observing the flight of birds, looked towards the east; while the poets look towards the *Fortunate Isles*. In books of geography, therefore, by the right hand we must understand the east; in those of astronomy, the west; in such as relate to augury, the south; and in the writings of poets, the north.

Under the article ASTRONOMY, n^o 376, *et seq.* the method of drawing a meridian line is fully explained; the knowledge of which is absolutely necessary both for geographers and astronomers. To what is mentioned there we shall only add further, that the time for drawing a line of this kind is when the sun is nearly at the summer solstice; because the difference of declination is then scarce perceptible for several days, and in the few hours requisite for the operation may be totally disregarded. The winter solstice would do equally well, were it not that the sun is then so low in the heavens that a difference in the refraction might cause a considerable error in the result. The motion of the luminary above the horizon is likewise so oblique, that he changes his vertical faster than his alti-

tude, which is inconvenient in an operation where we are to determine the vertical by the altitude. A clear day must be chosen for the purpose; and the ground on which the shadow falls ought to be white, that the shadow may be the better defined. The stile ought not to be too high, because then the top of the shadow will be indistinct; neither ought it to terminate in a point, for the same reason. Dr Long recommends the top of it to be about an eighth of an inch thick. Having drawn a meridian line upon one plane, we may draw one upon another by the following method: Hang a thread with a plummet exactly over the south end of the meridian line given, and another on the plane on which the meridian line is to be drawn. Let one person observe at noon the moment when the shadow of the first thread falls exactly upon the meridian given, and let another observer at the same time mark two distant points in the shadow of the second thread: a line drawn through these points is the meridian line required. Thus also a meridian line may be drawn upon a south wall by marking two points in the shadow of a thread hung at a little distance from it. If the meridians are near, he that observes the shadow of the first thread may let the other know the moment it falls upon the meridian line by saying, *Now*; if far distant, it should be done by the motion of the hand, because sound takes up some time in passing from one place to another. A quadrant or other astronomical instrument may now be fixed in the meridian line in such a manner as to be capable of different elevations, in order to observe the altitudes of the different celestial bodies; the plane of that side of the instrument on which the degrees are marked being all the while kept in the meridian. The mural arc in the Royal Observatory at Greenwich is a wall of black marble; one side of which, standing exactly in the plane of the meridian, has a large and accurately divided brass quadrant fixed to it, moveable round its centre, and with telescope sights. See ASTRONOMY, n^o 497. At sea, where they cannot have a meridian line, the greatest height of a star or the sun is taken for the meridian height.

Having got a meridian line by either of the methods mentioned under the article ASTRONOMY, it may be prolonged to what length we please, and the distance of it measured. The meridian of the royal observatory at Paris being found, and an instrument through which telescopic sights placed vertically therein, the north and south points of the visible horizon were observed through the sights, and a pillar erected upon the north point; then, by another instrument placed horizontally, several distant objects, as steeples, &c. were viewed, and the angles which the visual lines made with the meridian line were observed. From the places of these new objects, then, others were observed; and where natural objects were deficient, they set up large poles. Thus several triangles were formed along the meridian: and in order to measure those triangles, a paved way from *Villejuive* to *Juvisy* was made choice of for the fundamental base, as lying in a straight line from north to south. For the actual measurement of this way, two poles were made use of, each of them four toises in length, and made of two pike-staves joined together at the great ends by a screw. One of the measuring poles was first laid upon the ground;

ground; the other was joined to it end to end along by a rope stretched from north to south: the first pole was then taken up and laid down at the end of the second, and so on successively; and for the greater ease in keeping the account, the measurer who laid down the second pole had ten little stakes given him, one of which he stuck into the ground at the end of his pole every time he laid it down; so that every stake marked eight toises; the whole, when stuck into the ground, marking 80 toises. Thus the length of the road above mentioned was twice measured, and found to be 5663 toises and 4 feet in going, and 5663 toises and 1 foot in returning; so that as a greater exactness could not be hoped for, 5663 toises were pitched upon as the true length of this fundamental base. This is represented fig. 5. by the line OP; and the calculations of the triangles upon it were made in the following manner. The angle COP was observed from O, one end of the base; from the other end the angle OPC; and from the station C the angle OCP: and thus all the angles of the triangle CPO, and the length of one side OP, being known, the lengths of the remaining sides OC and PC were found by calculation. The next step was to observe all the angles of the triangle OBC, and from thence, and the known length of the side OC, to calculate the other side OB and BC. Then all the angles being observed, and the side BC being known of the triangle ABC, which may be called the first or principal triangle of the meridian of the observatory, the other sides AB and AC were found. Then, from one of the sides now known, and the angles observed, all the sides of the next adjoining triangle CBE were found. Thus they proceeded from one triangle to another to the place where the meridian ended in the south part of France; and there the last triangle was terminated by a base of the length of 7246 toises, which was actually measured in order to verify the preceding operations. The meridian line of Paris being prolonged in the manner just now described, the situation of several other places in France was determined by trigonometry, and an accurate map of the country drawn, especially of those parts which lie near the meridian of Paris.

Having found a meridian line, the transits or passages of the heavenly bodies across it may be observed by hanging two threads with plummets exactly over it, at a little distance from one another, which consequently will be directly in the plane of the meridian: if you place your eye close to one of the threads in such a manner that you make it cover the other, and both appear as one thread, when a star is behind the threads, it is in the meridian. By the same method the sun may be viewed through a smoked glass: when the threads pass through his centre he is in the meridian. But the best way of observing either the sun, moon, stars, or planets, is through a telescope placed in the meridian, with two cross hairs, one of which is in a vertical, the other in an horizontal position. The sun is in the meridian when the vertical hair passes through his centre.

To find the elevation of the pole in any place, take the greatest and least height of some star which never sets, the middle height between these extremes is the elevation of the pole. Or the elevation of the pole may be found by one observation of the height of a

star in the meridian, if the declination of that star be known; for as the distance from the pole is the complement of its distance from the equator, this being subtracted from the greatest height of the star, leaves the elevation of the pole desired. The same thing may be done by observing the least height of a star, and adding to that the distance from the pole: but for observations of this kind we ought to choose the time when the stars are in the zenith, and not pitch upon any who happen to be near the horizon; because the refraction occasions such errors as are too considerable not to affect the observations materially.

The height of the equator is found by taking the height of the sun or a star when we know by an almanack they have no declination; or it may be otherwise known by taking the meridian height of the sun, and adding or subtracting the known declination. Having found the height of the equator, we know the elevation of the pole; or, having found the elevation of the pole, we know that of the equator, the one being the complement of the other.

A method much used by the ancients was that of taking the altitudes of the celestial bodies by means of a gnomon, or upright pillar erected for this purpose. Thus the height of the pole and the seasons of the year might be known by observing the length of the meridian shadow, which would be greater or less according to the altitude of the sun at that time. The most ancient observations of this kind were those made by Pytheas in the time of Alexander the Great, at Marseilles in France, by which he found the meridian length of the shadow at the summer solstice to be to the height of the gnomon as $21\frac{1}{2}$ to 600; the same which Gassendus afterwards found it in the year 1636.

The elevation of the pole may be found by means of the gnomon, by finding the meridian height of the sun; for this being given, we have the elevation of the equator, and consequently that of the pole. The meridian height of the sun may be found in the following manner. Let AC, fig. 1. be the gnomon, AB the shadow, and CB part of a ray drawn from the centre of the sun passing by the top of the gnomon and terminating the shadow at B. These three lines form a right-angled triangle BAC, whereof the two legs AB and AC are given, the number of feet and inches in them being found by actual mensuration. Hence the acute angles may be found in the following manner. Let one leg be radius, and the other will be tangent of the opposite angle. Thus, if we make AB radius, AC will be tangent of the opposite angle ABC. This tangent is found by the golden rule, as the number of feet, inches, &c. in AB, is to the number of feet, inches, &c. in AC; so is the radius to a fourth number, which is the tangent required. This fourth number looked for in the table of tangents gives the measure of the angle ABC, which is the meridian height of the sun required.

This method of observation, however, is by no means accurate; and Ricciolus takes notice of the following deficiencies in the ancient observations made in this manner: 1. They did not take into account the sun's parallax, which makes his apparent altitude ten seconds less than it would be if the gnomon were placed at the centre of the earth. 2. They neglected refraction,

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tion, by which the apparent height of the sun is somewhat increased. 3. They made their calculations as if the shadow were terminated by a ray coming from the sun's centre; whereas it is bounded by one coming from the upper edge of his limb. In many cases, however, these errors are of no moment; but at any rate they may be corrected in the following manner: To the altitude of the sun found by the gnomon, add his parallax of 10'', and take from the sum the semidiameter of the sun at that time, which is about 16'; together with the refraction, which is different at different heights of the sun, and must be had from a table of refractions. Thus the altitude of the sun will be had free of any errors, excepting those unavoidable ones arising from the difficulty in finding the true length of the shadow by reason of the penumbra, which always accompanies it.

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Gnomons
which do
not show
the altitude
by the shadow.

Some gnomons show the altitude of the sun not by the shadow, but by an hole in the top made in a plate of metal inserted there, through which the rays fall upon a level pavement. In gnomons of this kind the centre of the instrument is always exactly under the hole in the metal-plate; and the method of finding the height of the sun is the same as that already described. A gnomon of this kind was made in the year 1576 by Egnatio Dante in the church of St Petronia at Bologna. Near the top of the south wall of the church he placed a brass plate about three-eighths of an inch thick, in which was cut a circular hole almost exactly an inch in diameter. The plate was set in the wall at an angle of about $45\frac{1}{2}$ deg. the height of the equator in that place. The height of the hole in the plate from the ground is near 66 feet, and the length of the line drawn upon the pavement is 169 feet. This line, however, is not exactly in the meridian, but as near it as the pillars of the church would admit; and on it the rays of the sun, passing through the hole, formed an ellipsis at different distances from the wall, according to the season of the year. Another gnomon of this kind was made in the same church by Dominico Cassini in 1645. He placed the brass-plate through which the rays of the sun were to pass in the roof of the church, and drew a meridian line 120 feet long upon the pavement; which performance was so much approved, that a medal was struck upon the occasion. In like manner Bianchini and Moraldi drew a meridian line upon the pavement of the great hall of the baths of Dioclesian, now the church of the Carthusians at Rome.

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Construction
of these gnomons.

To construct gnomons of this kind, place the brass-plate with the hole in it in the south end of the roof of the building; by a thread with a plummet at the end of it let down through the centre of the hole, find the point in the pavement which is exactly under it; this point is the centre of the gnomon; from this centre draw several concentric circles: an hour or two before and after noon mark the points where the northern as also where the southern edge of the sun's picture touches these circles, and there will be several arches, through the middle of which a line drawn from the centre of the gnomon is a meridian line, as will be understood from what has been already said concerning the method of drawing these lines. The meridians just mentioned are usually marked upon long plates of brass, with which the marble pavement is in-

laid; there are also drawn upon it lines crossing the meridians at right angles, to show how far the centre of the sun's image reaches at different times of the year: when this at noon is farthest from the centre of the gnomon, the sun is then lowest, and it is the winter solstice: when the same picture is nearest to the centre of the gnomon, the sun is highest, and consequently he is then in his greatest north declination, and it is then the summer solstice.

The time of the solstice is observed, by marking exactly the distance of the sun's picture from the centre of the gnomon the day before and the day after the solstitial day: if these distances be exactly equal, the meridian heights of the sun are for these two days exactly equal; and then the time of the sun's being in the solstitial point is exactly at noon: if the distance of the sun's picture from the centre of the gnomon be greater the day before the solstice than it is the day after, it shows that the time of the solstice is before noon; and if less, that it is after noon. It is, however, extremely difficult to determine the exact moment of the solstice by this method, or even to approach within some hours of it; for at those times the sun's declination, and consequently his meridian height, alters not above 15'' in a natural day; and therefore an error of more than 15'' in the observation of the sun's meridian height will occasion an error of a whole day in fixing the time of the solstice, an error of one half of 15'' will occasion an error of half a day; and so in proportion.

The time of the equinox is found by a gnomon in the following manner: On the day of the equinox find the meridian height of the sun and the height of the equator. If these be equal, the equinox is exactly at noon; if the height of the sun be different from that of the equator, then as many minutes as the sun is higher than the equator, so many hours is the moment of the equinox before noon; as many minutes as the sun is lower than the equator, so many hours is the equinox after noon. The reason of this computation is, that at the equinox the declination of the sun alters at the rate of 24 minutes in a natural day, which is at the rate of a minute in an hour; whence it appears that the equinoxes are much more easily observed than the solstices. It is probable that many of the obelisks in Egypt were erected for the purpose of observing the altitude of the sun by the length of the shadow. It is likewise worth observing, that the Spaniards at the conquest of Peru found pillars of curious and costly workmanship, by the meridian shadows of which their *Amautas* or philosophers had by long experience and observation learned to determine the time of the equinoxes: these seasons of the year were celebrated by them with great festivity and rejoicing in honour of the sun, whom they imagined to sit at those times in all his glory upon the throne they had erected for him; and therefore on those days they presented him with rich offerings of gold, silver, jewels, and other valuable gifts; adorning his throne, as they did also the pillars, with fragrant herbs and flowers.

The principal uses which geographers have for observing the altitudes of the celestial bodies with such accuracy, are to determine the length of the year, the seasons, but especially the distance of places on the earth, their situation with regard to one another, and

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To find
the time
of the sol-
stice.

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Of the
equinox.

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Geographical
uses
of the ob-
servation
of the he-
avenly bo-
dies.

A TABLE showing the Height of the Apparent Level above the True.

the dimensions of the whole. An account of the most remarkable attempts for discovering the circumference of the globe has been given in the preceding section. The foundation of the whole is to obtain an exact measure of one degree of the meridian; which being once got, we have only to multiply the number of miles, feet, or any other measure employed, by 360, the number of degrees in the circumference, and the product is that of the whole globe. This being obtained, we may easily determine its superficial and solid contents by the geometrical methods employed in other cases. According to the best calculations which have yet appeared, the dimensions of this globe are as follow.

	English miles.
One minute of a degree contains	$1\frac{2}{3}$
A degree	$69\frac{1}{2}$
The circumference	24,930
The diameter	$7935\frac{2}{3}$
The semidiameter	$3967\frac{1}{3}$
The superficial measure	200,000,000

The solid contents two hundred and sixty-six thousand millions of cubic miles.

A second of a degree is no more than $101\frac{1}{2}$ English feet.

In making measurements of this kind, the principal difficulty arises from the want of an absolutely level surface, the length of which may be determined by actual mensuration as the foundation of our calculations. Snellius, as has already been mentioned, had a singular opportunity of this kind by means of a great extent of ice; and similar conveniences might be had on the frozen lakes in the north of Europe, though difficulties would there arise from the great refraction of the atmosphere. It must likewise be considered, that there is always some difference between the apparent level and the true, which in great distances is apt to affect our calculations materially. A truly level surface is the segment of any spherical surface concentric to the surface of the earth: thus the surface of the sea or any large piece of water when at rest forms itself into a true level. A true line of level then is an arc of a great circle, which we suppose to be described upon a truly level surface. The apparent level is a straight line drawn tangent to the true level; whence every point of the apparent level, excepting only that of contact, is somewhat higher than the true level. This difference is easily known after the semidiameter of the earth is known. Thus in fig. 6. let the observer standing at A look through a telescope placed horizontally at the object B; here BAC is a right-angled triangle, in which if AC be made radius, AB will be tangent, and CB secant of the angle ACB. Now, to find this tangent, say, as the number of feet in AC is to the number of feet in AB, the distance of the object; so is AC as radius to AB as tangent. Then having found the tangent AB in the table, we have the secant CB; from which if the radius CG be taken, the remainder GB is the excess of the secant above the radius, or the height of the apparent level above the true. The following table was constructed by Cassini.

Seconds.	Feet.	Inch.	Inch.
1	101	6.8	
2	203	1.6	
3	304	8.4	
4	406	3.2	
5	507	10.0	0.074
6	609	4.8	
7	710	11.6	
8	812	6.4	
9	914	1.2	
10	1015	8.0	0.196
11	1117	2.8	
12	1218	9.6	
13	1320	4.4	
14	1421	11.2	
15	1523	6.0	
16	1625	0.8	
17	1726	7.6	
18	1828	2.4	
19	1929	9.2	
20	2031	4.0	1.186
21	2132	10.8	
22	2234	5.6	
23	2336	0.4	
24	2437	7.2	
25	2539	2.0	
26	2640	8.8	
27	2742	3.6	
28	2843	10.4	
29	2945	5.2	
30	3047	0.0	2.670
31	3148	6.8	
32	3250	1.6	
33	3351	8.4	
34	3453	3.2	
35	3554	10.0	
36	3656	4.8	
37	3757	11.6	
38	3859	6.4	
39	3961	1.2	
40	4062	8.0	4.746
41	4164	2.8	
42	4265	9.6	
43	4367	4.4	
44	4468	11.2	
45	4570	6.0	
46	4672	0.8	
47	4773	7.6	
48	4875	2.4	
49	4976	9.2	
50	5078	4.0	7.400
51	5179	10.8	
52	5281	5.6	
53	5383	0.4	
54	5484	7.2	
55	5586	2.0	
56	5687	8.8	
57	5789	3.6	
58	5890	10.4	
59	5992	5.2	
60	6094	0.0	10.680

If the distance of the object from the place of the spectator be which measured in a great circle upon the earth amounts to

the height of the apparent level above the true will be

The Continuation of the Foregoing Table.

Min.	Feet.	Feet.	Inch.
1	6094	0	10.680
2	12188	3	6.580
3	18282	7	11.853
4	24376	14	1.812
5	30470	22	1.932
6	36564	31	11.412
7	42658	42	5.436
8	48752	56	9.384
9	54846	71	9.876
10	60940	88	7.728
11	67034	107	2.940
12	73128	127	7.512
13	79222	149	9.444
14	85316	173	8.736
15	91410	199	4.320
16	97504	226	9.264
17	103598	255	11.568
18	109692	286	11.232
19	115786	319	7.188
20	121880	354	0.504
21	127974	390	4.248
22	134068	428	5.352
23	140162	468	10.224
24	146256	510	6.084
25	152350	553	11.232
26	158444	599	1.776
27	164538	646	1.680
28	170632	694	10.944
29	176726	745	5.568
30	182820	797	8.484
31	188914	851	9.828
32	195008	907	8.532
33	201102	965	3.528
34	207196	1024	7.884
35	213290	1085	9.600
36	219384	1148	8.676
37	225478	1213	5.112
38	231572	1277	10.908
39	237666	1348	2.064
40	243760	1417	1.764
41	249854	1496	11.388
42	255948	1569	10.452
43	262042	1638	9.084
44	268136	1716	0.108
45	274230	1794	11.424
46	280324	1875	7.032
47	286418	1958	0.000
48	292512	2042	2.328
49	298606	2128	2.016
50	304700	2215	6.792
51	310794	2305	5.472
52	316888	2396	9.240
53	322982	2489	10.368
54	329076	2584	8.856
55	335170	2681	4.704
56	341264	2779	9.912
57	347358	2880	0.480
58	353452	2982	0.408
59	359546	3085	8.628
60	365640	3191	2.208

If the distance of the object from the place of the spectator be
which measured in a great circle upon the earth amounts to
the height of the apparent level above the true will be

The uses of this table are, 1. An arc of a great circle on the earth being given in seconds or minutes, to find the length of it in miles or feet. Thus an arc of 8 seconds is 812 feet six inches and four-tenths of an inch; and thus again an arc of 20' is 121880 English feet. 2. An arc of a great circle upon the earth being given in seconds or minutes, or in feet or inches, to find the height of the apparent level above the true. In very small arcs this is so little, that it may be disregarded, and is therefore marked only at 5", and afterwards at every 10" in the table of seconds, and at every single minute in the other. 3. The distance of any object which is viewed through sights placed horizontally being given, the height of it may be found; or conversely, the height of any object being given, the distance of it may be found. Thus, if the distance of an object whose top is in the horizon be 15' or 91410 feet, the height of that object is 199 feet 4 inches; and thus conversely, if the height of an object whose top is in the horizon be 199 feet 4 inches, the distance will be 91,410 feet. 4. If the distance of an object given be a number of feet which is not in the table, take that which is next to it, and say, as the square of the number thus taken is to the square of the number given; so is the height of the apparent level above the true, corresponding to the number taken, to the height of the apparent level which corresponds to the number given. Thus, if it be inquired what is the height of the apparent level above the true when the distance of the object is 200,000 feet, the nearest number to this in the table is 201,102, the height of the level corresponding thereto is 965 feet; say then, as the square of 201,102 is to the square of 200,000; so is 965 to a fourth number by which the apparent level exceeds the height of the true one, at the distance of 200,000 feet.

Hitherto we have supposed the line of level to be a tangent to an arc of a great circle drawn upon the surface of the earth; whereas in levelling, the eye is usually at some distance above the surface, suppose 4 feet: but this makes no difference in levelling; for as the height of the eye must be added to the secant CB, fig. 6. because ML is supposed in levelling to be parallel to HD, there is indeed a difference between the length of AI and BL, but it is quite insensible. Another use of the table is for levelling, in order to convey water from one place to another. See LEVELLING. We shall now proceed to give a solution of some geographical problems relating to the horizon.

1. To find the extent of the visible horizon, the semidiameter of the earth and height of the eye being given. Let ADE, fig. 3. be an arc of a great circle upon the earth, C the centre of the earth, B the eye of the observer, BD the height of the eye, BA and BE lines drawn from the eye touching the surface of the earth at A and E, and terminating the visible horizon; the length of BA is required. In order to find it, add DB the height of the eye, which suppose to be 5 feet, to DC the semidiameter of the earth, which is 20,949,655 feet, and you have the length of CB 20,949,660 feet; draw CA, and you have a triangle BAC whose angle at A is a right one; make the hypotenuse CB radius, and CA will be the sine of the opposite angle ABC. Say then, as CB is to CA; so is the whole sine or radius to the sine of the angle ABC.

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Of finding
the extent
of the ho-
rizon.

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and
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and
Practice.58
Depression
of the hori-
zon of the
sea.59
Extent of
the hori-
zon at any
height of
the eye.

ABC. This angle being found, its complement ACB is known, and consequently also the arc AD, which may be found in feet or miles by the table: Thus, in the foregoing example, as 20,949,660 is to 20,949,655; so is the radius 1000, &c. to a fourth number, viz. 9,999,993, which number is the sine of an angle of $89^{\circ} 56'$; the angle ABC then is $89^{\circ} 56'$; and therefore its complement ACD is $4'$, and the arc DA is $4'$; that is, by the table, 24376 feet.

2. To find the depression of the visible horizon of the sea at a given height of the eye. In fig. 3, if the eye be at B, the sensible horizon is FG, the depression of the horizon of the sea is the angle FBA; which, being the complement of ABC, is equal to ACD, that is, $4'$.

3. To find the extent of the visible horizon at any height of the eye by observation. The semidiameter of the horizon does not sensibly differ from an arch of a great circle upon the earth of the same number of minutes and seconds as the angle of depression is observed to be; and the number of feet contained in that arc may be found in the table: Thus, if the depression of the horizon be $30'$, its semidiameter is also $30'$; that is, by the table 182,820 feet. Various accounts of the extent of the visible horizon are given by different authors: either because they differ in their accounts of the earth's semidiameter from whence that of the horizon is computed, or in the measures they make use of.

The following table, taken from Cassini, shows the different depressions of the horizon of the sea at different heights of the eye, both by observation and calculation; with the difference betwixt the two occasioned by refraction.

The height of the eye above the surface of the sea.		The depression of the horizon of the sea.	
Feet	Inches	' "	
1157	6, 9	{ 32 30 36 18	by observation by calculation
Difference by refraction		3 48	
775	2, 3	{ 27 0 29 36	by observation by calculation
Difference by refraction		2 36	
571	11, 0	{ 24 0 25 25	by observation by calculation
Difference by refraction		1 25	
387	3, 4	{ 19 45 20 54	by observation by calculation
Difference by refraction		1 9	
288	4, 3	{ 15 0 17 1	by observation by calculation
Difference by refraction		2 1	
187	0, 9	{ 13 0 14 41	by observation by calculation
Difference by refraction		1 41	
9	7, 3	{ 3 20 3 18	by observation by calculation

Here the calculated depression is greater than that by observation in all the cases except the last, which is less by two seconds; but the instrument used by our author would not discover such a small difference. Refraction by raising the objects of vision makes the angle of depression less; but refraction itself is variable, and of consequence the depression and extent of the horizon also. Cassini informs us, that, even in the finest weather, refraction was different at the same hours of different days, and at different hours of the same day. The truth of this position is easily seen by fixing a telescope with cross hairs, so that the weather-cock of a distant steeple may be viewed through it: for at different times of the day the weather-cock will sometimes appear in the centre of the object-glass, sometimes above and sometimes below it: the same experiment may also be tried with plain sights. It has long been observed, that the top of a distant hill may at some times, when the refraction is greatest, be seen from a station from which at other times, when refraction is less, it cannot be seen, even when the weather is sufficiently clear.

Hitherto we have supposed the circumference of the earth to be exactly circular, or the globe itself to be an exact sphere; but, from some observations, this appears not to be the case. Some time ago, the French made an observation, showing that a pendulum vibrates slower in proportion as it is brought nearer to the equator: that is, the gravity or celerity of descent of the pendulum, and of all other bodies, is less in countries approaching to the equator than in places near either pole. This excited the curiosity of the celebrated philosophers Huygens and Newton, who thence conjectured that the earth must have some other figure than what was commonly supposed. Sir Isaac Newton afterwards demonstrated that this diminution of weight naturally arises from the earth's rotation round its axis; which, according to the laws of circular motion, repels all heavy bodies from the axis of motion: so that this motion, being swifter at the equator than in parts more remote, the weight of bodies must also be much less there than nearer the poles.—To determine this matter, several mathematicians were by the French king employed to measure a degree on the earth's surface in different parts of the world; and, according to their mensurations, the diameter of the earth from north to south is shorter than that from east to west by 36 miles.

With regard to the method of finding the longitudes and latitudes of particular places, rules have been already laid down under ASTRONOMY, n^o 408, and 482, 483. The same thing, however, may be done by other methods. Thus the latitude may be found by observing exactly the meridian altitude of the sun, and knowing his declination for that day, the declination subtracted from the meridian altitude gives the complement of the latitude, and this last subtracted from 90° leaves the latitude required. As to the longitude, Mr Harrison, by his invention of time-pieces which go much more exactly than either clocks or watches could be made to do formerly, hath in a great measure facilitated that. For supposing any person, possessed of one of these time-pieces, to set out on a journey, e. g. from London. If he adjusts his time-piece properly before he goes away, he will know the hour

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Earth not
an exact
sphere.61
Of finding
the longi-
tudes and
latitudes.

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hour at London exactly, let him go where he pleases; and when he hath proceeded so far either eastward or westward, that a difference is perceived betwixt the hours shown by his time-piece, and those on the clocks or watches at the place to which he goes, the distance of that place from London in degrees and minutes of longitude will be known; and if the length of a degree of longitude is known, the real distance between the two places may also be easily found. It is not to be expected, however, that any instrument, with whatever care it may be constructed, can always be depended upon as an exact measurer of time; and therefore frequent corrections of longitudes taken in this manner will be necessary. The method of finding the longitude from the eclipses of Jupiter's satellites appears to be the best of any. Eclipses of the sun, and occultations of the stars by the moon, are also very proper, though they happen but seldom. Eclipses of the moon have also been made use of for this purpose; but it is found impossible to observe either the beginning or end of a lunar eclipse with the accuracy necessary for determining the longitude of any place.—All these different methods agree in this, that they determine the longitude by the difference of time between the observation of the phenomenon in two different places; and of this time, four minutes are to be allowed for every degree of longitude either east or west.

62.
Of the different kinds
of maps.

After the geographer is thus become acquainted with the longitudes and latitudes of a great number of different places, he may delineate them upon paper, or make a *map*, either of the whole world, or of any particular country with which he is best acquainted. General maps of the world, or of very large tracts, answer the purpose of showing in what manner the different countries of the world lie with respect to each other. They cannot be made of such a size as to admit the delineation of many particular towns or cities, neither indeed is it at all required. Where the whole world is delineated at once, the mind can hardly take in more than the idea of the situations of different kingdoms from one another; the situations of the different cities of each particular kingdom being almost wholly overlooked, and not attended to: and this happens likewise where a very large portion of the globe, as one of the four quarters, is represented on a single map. Besides these, therefore, it is necessary to have particular maps of all the different countries done upon a larger scale, that thus the mind may not be fatigued by endeavouring to comprehend too much at once. The qualifications which maps ought to have, in order to render them complete, are, 1. That they represent the countries exactly of the same shape, and in the same proportions to the eye, that they really have on the earth itself. 2. That the divisions of one country from another be distinctly marked, and readily perceptible, without a disagreeable and tedious search. 3. That the longitudes and latitudes of different places be found exactly on the map, and with little or no trouble.

The foundation of all maps is what is called *the projection of the sphere*, i. e. the delineation of those circles apparently traced out by the sun in the heavens, upon some substance, either plane or spherical, designed to represent the surface of the earth; upon which also are delineated the parallels of latitude, and the meridians,

N^o 137.

in as great number as the size of the map will admit of without confusion.

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and
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These delineations upon a spherical surface are very easy: and under the article *GLOBE*, full directions are given for the construction of the spherical substances upon which maps of the earth and the heavens are usually delineated; and which, when furnished with the rest of their apparatus, are called *terrestrial* and *celestial globes*. The method of drawing the maps for these globes is never followed in any other case; for which reason it is also referred to the article *GLOBE*. The ordinary kinds of maps are constructed by delineating the circles of the sphere upon a plane surface, according to the rules of perspective. This is properly the projection of the sphere; and is designed to give a view of the terraqueous globe, as it would appear, at some distance, to an eye that could take in the whole extent of it at once.

§ 1. Of Projections of the Spheres and Maps.

Of projections there are two kinds, the *orthographic* and *stereographic*; both of which represent the surface of the earth projected upon the plane of one of its great circles.

1. The *orthographic* supposes the eye to be placed at an infinite distance in the axis of the circle of projection, while the *stereographic* supposes it to be only in the pole of that circle. The circles on which the projections are usually made, are, the equator, some of the meridians, or the rational horizon of some particular place. For maps of the world a meridian is generally chosen; and most commonly that one which passes through Ferro, one of the Canary islands, because thus the continents of Europe, Asia, and Africa, are conveniently delineated in one circle, and America in the other.

63.
Orthographic
projection.

1. To project the sphere orthographically on the plane of any meridian, we have only to consider, that as the eye is supposed to be at an infinite distance, all the rays which come from the disk of the earth are parallel; and consequently all lines drawn from the eye to the disk must be perpendicular to the latter. Let therefore, A B C D, (fig. 1.) represent the plane of one of the meridians. The equator, which cuts all the meridians in the middle, must be represented by an infinite number of points let fall upon the plane of projection, and dividing it exactly in the middle; that is, by the right line B D. The parallels of latitude, being also perpendicular to the plane of the meridian, will be marked out by an infinite number of right lines let fall from their peripheries upon that plane, thus forming the right lines *ab*, *cd*, &c. The meridians will likewise be represented on the disk by an infinite number of right lines let fall perpendicularly from their peripheries upon the plane of projection, and thus will form the elliptic curves A10C A20C, &c. From an inspection of the figure, therefore, it appears, that in this projection both longitudes and latitudes are measured by a line of sines, and both of them decrease prodigiously as we approach the edges of the disk; and hence the countries which lie at a distance from the equator are exceedingly distorted, and it is even impossible to draw them with any degree of accuracy. The orthographic projection on the plane of a meridian, therefore, is never used but for a map of the world.

64.
On the
plane of a
meridian.

Plate
CCIX.

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65
the e-
quator.

66
any
particular
horizon,
3.

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stereogra-
phic pro-
jection.

2. On the plane of the equator, the orthographic projection represents the meridians as straight lines diverging from a centre, and the parallels of latitude as concentric circles. The latter, however, are by no means to be placed at equal distances from each other; for the meridians are to be divided by the line of fines, as in the last; and thus the equatorial parts of the globe are as much distorted and confused as the polar ones were in the foregoing. This projection, therefore, is seldom used for a map of the whole world, though it answers very well for a representation of the polar regions.

3. On the horizon of any particular place, except either of the poles, or any point lying directly under the equator, the orthographic projection represents both parallels and meridians by segments of ellipses. The figure shows a map done on the horizon of Ur of the Chaldees: it is obvious, however, that a considerable degree of distortion takes place here also; though less than in the former cases. Projections of this kind, therefore, are used only for the construction of solar eclipses. See ASTRONOMY, sect. x.

II. The stereographic projection of the sphere supposes the eye to be in the pole of the circle of projection. The laws of this projection are,

1. A right circle is projected into a line of half tangents.

2. The representation of a right circle, perpendicularly opposed to the eye, will be a circle in the plane of the projection.

3. The representation of a circle placed oblique to the eye, will be a circle in the plane of the projection.

4. If a great circle is to be projected upon the plane of another great circle, its centre will lie in the line of measures, distant from the centre of the primitive by the tangent of its elevation above the plane of the primitive.

5. If a lesser circle, whose poles lie in the plane of the projection, were to be projected; the centre of its representation would be in the line of measures, distant from the centre of the primitive, by the secant of the lesser circles distance from its pole, and its semidiameter or radius be equal to the tangent of that distance.

6. If a lesser circle were to be projected, whose poles lie not in the plane of the projection, its diameter in the projection, if it falls on each side of the pole of the primitive, will be equal to the sum of the half tangents of its greatest and nearest distance from the pole of the primitive, set each way from the centre of the primitive in the line of measures.

7. If the lesser circle to be projected fall entirely on one side of the pole of the projection, and do not encompass it: then will its diameter be equal to the difference of the half tangents of its greatest and nearest distance from the pole of the primitive, set off from the centre of the primitive one; and the same way in the line of measures.

8. In the stereographic projection, the angles made by the circles of the surface of the sphere, are equal to the angles made by their representatives in the plane of their projection.

For a demonstration of these laws, see the articles PERSPECTIVE and PROJECTION. The method of deli-

neating general maps of the world will, however, be easily understood by the following directions.

1. To delineate a map of the earth upon the plane of a meridian. Draw a circle of any convenient magnitude, as ABCD, to represent one half of the earth's disc; draw two diameters AB, CD, intersecting each other at right angles; AB will then represent the equator, and CD that meridian which is directly perpendicular to the plane of projection, C will be the north pole, and D the south pole. Divide the circle into 360 equal parts, representing the degrees of latitude; or into smaller parts, if it can admit of such a division, to represent minutes. Then, by means of a sector, divide the equator AB into two lines of semitangents EA and EB, which will represent the degrees of longitude. Then with the secant of 80° , as a radius describe the arch of the circle CcD, which represents a meridian cutting the plane of projection, at an angle of 80° ; with the secant of 70° , describe the arch C d D, which represents a meridian cutting the plane of projection at 70° ; and thus proceed with the rest of the meridians, which are usually drawn at every 10 degrees longitude, as the parallels are at every 10 degrees latitude. These last are to be drawn with the tangents for radii as the meridians are with the secants; GH representing the parallel of 10 degrees, with the tangent of 80° , that of 20 with the tangent of 70° , &c. The ecliptic AQB is drawn with the tangent of 66.31 for a radius, its greatest distance from the equator being 23.29. This is the most common projection for maps of the world, and is that on which the map Plate CCXIV. is delineated. It hath this disadvantage, however, that neither the degrees of longitude nor latitude continue of the same length, even under the same parallel; and consequently the shape of the countries is somewhat distorted: it is also exceedingly difficult to find the precise degree of longitude or latitude belonging to any place upon maps of this kind, as must be evident from an inspection of the figures.

2. On the plane of the horizon. Suppose, for instance, it is desired to have London the centre of the map: its latitude we will suppose to be 51 degrees 32 minutes. Take then the point E (fig. 5.) for London; and from this, as a centre, describe the circle ABCD to represent the horizon; which you are then to divide into four quadrants, and each of these into 90 degrees. Let the diameter BD be the meridian, B the northern quarter, D the southern; the line of equinoctial east and west shows the first vertical, A the west, C the east, or a place of 90 degrees from the zenith in the first vertical. All the verticals are represented by right lines drawn from the centre E to the several degrees of the horizon. Divide BD into 180 degrees, as in the former method; the point in EB representing 51 deg. 32 min. of the arch BC, will be the projection of the north pole, which note with the letter P. The point in ED representing 51 deg. 32 min. of the arch DC (reckoning from C towards D), will be the projection of the intersection of the equator and meridian of London; and from this, towards P, write the numbers of the degrees, 1, 2, 3, &c. As also towards D, and from B towards P, viz. 51, 52, 53, &c. Then taking the corresponding points of equal degrees, 88, 89, &c. about those, as diameters, describe circles, which will represent parallels, or circles of latitude,

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On the
plane of a
meridian,
fig. 6.

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On a parti-
cular ho-
rizon.

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titude, with the equator, tropics, and polar circles. For the meridians, first describe a circle through the three points A, P, C. This will represent the meridian 90 degrees from London. Let its centre be M in BD (continued to the point N, which represents the south pole), PN being the diameter: through M draw a parallel to AC, viz. FH, continued each way to K and L. Divide the circle PHNF into 360 degrees, and from the point P draw right lines to the several degrees cutting KFH L: through the several points of intersection, and the poles P, N, as through three given points, describe circles representing all the meridians. The centres for describing the arches will be in the same K L, as being the same that are found by the former intersection; but are to be taken with this caution, that for the meridian next BDN towards A, the most remote centre towards L be taken for the first, the second from this, &c.—The circles of longitude and latitude thus drawn, insert the places from a table.

Maps of this kind may be useful for particular purposes: but the irregular length of the degrees, both of longitude and latitude, render them very unfit for representing the countries in their proper shape; and the difficulties in finding the particular degrees of longitude and latitude are even greater in this than any other projection, as is evident from the inspection of fig. 4.

III. Besides these, there may be a variety of other projections, though few of them are applicable to any particular purpose. The three following are those most generally useful, as having each some peculiar property which cannot be found in any other but themselves.

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Projection
in which
the earth is
supposed to
be conical.

1. If, instead of its globular figure, we suppose the earth to have a conical one, it is plain, that the meridians would be represented by straight lines diverging from the apex of the cone, while the parallels are shown by concentric circles placed at equal distances. This kind of projection is shown in Plate CCXIII. fig. 1, 2. It hath this great advantage, that the longitudes and latitudes may be found with the greatest ease by means of a moveable index placed on the centre. The whole earth may also be thus represented on a single circle: but thus the countries towards the south pole are prodigiously augmented in breadth in proportion to their length; for the degrees of longitude constantly increase the farther we are removed from the pole, while those of latitude still remain the same. This apparent error, however, doth not in the least affect the real proportion of the map, or render it more difficult to find the longitudes or latitudes upon it.

2. Mercator's projection supposes the earth, instead of a globular, to have a cylindrical figure; in consequence of which, the degrees of longitude become of an equal length throughout the whole surface, and are marked out on the map by parallel lines. The circles of latitude also are represented by lines crossing the former at right angles, but at unequal distances. The farther we remove from the equator, the longer the degrees of latitude become in proportion to those of longitude, and that in no less a degree than as the secant of an arch to the radius of the circle: that is, if we make one degree of longitude at the equator the radius of a circle; at one degree distant from the equator, a degree of latitude will be expressed by the secant of one degree; at ten degrees distance, by the secant of ten degrees; and so on*. A map of the world, therefore, cannot be delineated upon this projection, without distorting the shape of the countries in an extraordinary manner. The projection itself is, however, very useful in navigation, as it shows the different bearings with perfect accuracy, which cannot be done upon any other map. See CCXIII. fig. 3.

3. The globular projection is an invention of M. de la Hire, and is more useful than any of the former for exhibiting the true shape of the countries.* It may be made in the following manner: Having drawn a circle representing one-half of the earth's disc, draw two diameters as before, which represent the equator and vertical meridian. Divide each of these into 180 equal parts for the measures of the degrees of longitude and latitude. Then through the two poles, and every tenth division on the equator, draw arches of circles for the meridians; and in like manner through every tenth degree on each semicircle draw an arch, which shall likewise pass through every tenth division on the meridian for the parallels of latitude.

IV. The construction of maps of particular parts of the earth requires a different operation. Large portions of its surface may indeed be drawn on the plane of the meridian, as before directed; but when a small part, as the island of Britain, for instance, is to be represented on a large scale, it would be found difficult to draw the arches of such large circles as are necessary, and therefore the following method may be adopted. In this case, the degrees of longitude and latitude may be both represented by straight lines. It is to be remembered, however, that though the degrees of latitude always continue of an equal length, it is not so with those of longitude. They must necessarily decrease as we approach the pole. The proportion in which they decrease may be found by the line of longitudes on the plane scale; or by the following

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Mercator's
projection
supposing
it a cylinder.

* See Plate
CCXIII.

72
Globular
projection.

73
Construction of particular
maps.

TABLE,

TABLE, showing the Number of Miles contained in a Degree of Longitude, in each Parallel of Latitude from the Equator.

Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.
1	59	96	31	51	43	61	29	04
2	59	94	32	50	88	62	28	17
3	59	92	33	50	32	63	27	24
4	59	86	34	49	74	64	26	30
5	59	77	35	49	15	65	25	36
6	59	67	36	48	54	66	24	41
7	59	56	37	47	92	67	23	45
8	59	40	38	47	28	68	22	48
9	59	20	39	46	62	69	21	51
10	59	08	40	46	00	70	20	52
11	58	89	41	45	28	71	19	54
12	58	68	42	44	95	72	18	55
13	58	46	43	43	88	73	17	54
14	58	22	44	43	16	74	16	53
15	58	00	45	42	43	75	15	52
16	57	60	46	41	68	76	14	51
17	57	30	47	41	00	77	13	50
18	57	04	48	40	15	78	12	48
19	56	73	49	39	36	79	11	45
20	56	38	50	38	57	80	10	42
21	56	00	51	37	73	81	09	38
22	55	63	52	37	00	82	08	35
23	55	23	53	36	18	83	07	32
24	54	81	54	35	26	84	06	28
25	54	38	55	34	41	85	05	23
26	54	00	56	33	55	86	04	18
27	53	44	57	32	07	87	03	14
28	53	00	58	31	70	88	02	09
29	52	48	59	30	90	89	01	05
30	51	96	60	30	00	90	00	00

Suppose, then, it is required to draw the meridians and parallels for a map of Britain. This island is known to lie between 50 and 60 degrees of latitude, and two and seven of longitude. Having therefore chosen the length of your degrees of latitude, you must next proportion your degrees of longitude to it. By the table you find, that in the latitude of 50° the length of a degree of longitude is to one of latitude as 38,57 is to 60; that is, a degree of longitude in latitude 50 is somewhat more than half the length of a degree of latitude. The exact proportion may easily be taken by a diagonal scale; after which, you are to mark out seven or eight of those degrees upon a right line for the length of your intended map. On the extremities of this line raise two perpendiculars, upon which mark out ten degrees of latitude for the height of it. Then, having completed the parallelogram, consult the table for the length of a degree of longitude in lat. 60°, which is found to be very nearly one half a degree of latitude. It will always be proper, however, to draw a vertical meridian exactly in the middle of the parallelogram, to which the meridian on each side may converge; and from this you are to set off the degrees

of longitude on each side. Then, having divided the lines bounding your map into as many parts as can conveniently be done, to serve for a scale, you may by their means set off the longitudes and latitudes with much less trouble than where curve lines are used. This method may always be followed where a particular kingdom is to be delineated, and will represent the true figure and situation of the places with tolerable exactness. The particular points of the compass on which the towns lie with respect to one another, or their bearings, cannot be exactly known, except by a globe or Mercator's projection. Their distances, however, may by this means be accurately expressed, and this is the only kind of maps to which a scale of miles can be truly adapted.

§ 2. Description and Use of the Globes and Armillary Sphere.

WHEN we have thus discovered, by means of maps, or any other way, the true situation of the different places of the earth with regard to one another, we may easily know every other particular relative to them; as, how far distant they are from us, what hour of the day it is, what season of the year, &c. at any particular place. As each of these problems, however, would require a particular and sometimes troublesome calculation, machines have been invented, by which all the calculations may be saved, and every problem in geography may be solved mechanically, and in the most easy and expeditious manner. These machines are the celestial and terrestrial globes, and the armillary sphere; of which, and the method of using them, we proceed to give a description.

If a map of the world be accurately delineated on a spherical ball, the surface thereof will represent the surface of the earth: for the highest hills are so considerable with respect to the bulk of the earth, that they take off no more from its roundness than grains of sand do from the roundness of a common globe; for the diameter of the earth is 8000 miles in round numbers, and no known hill upon it is much above three miles in perpendicular height.

With regard to what we call *up* and *down*, see the article GRAVITY.

To an observer placed any where in the indefinite space, where there is nothing to limit his view, all remote objects appear equally distant from him; and seem to be placed in a vast concave sphere, of which his eye is the centre. The moon is much nearer to us than the sun; some of the planets are sometimes nearer and sometimes farther from us than the sun; others of them never come so near to us as the sun always is; the remotest planet in our system is beyond comparison nearer to us than any of the fixed stars are: and yet all these celestial objects appear equally distant from us. Therefore, if we imagine a large hollow sphere of glass to have as many bright studs fixed to its inside as there are stars visible in the heaven, and these studs to be of different magnitudes, and placed at the same angular distances from each other as the stars are; the sphere will be a true representation of the starry heaven, to an eye supposed to be in its centre, and viewing it all around. And if a small globe, with a map of the earth upon it, be placed on an axis in the centre of this starry sphere, and the sphere be made to turn round on this

axis,

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The terrestrial globe.

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The face of the heavens and of the earth represented in a machine.

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axis, it will represent the apparent motion of the heavens round the earth.

If a great circle be so drawn upon this sphere as to divide it into two equal parts or hemispheres, and the plane of the circle be perpendicular to the axis of the sphere, this circle will represent the *equinoctial*, which divides the heaven into two equal parts, called the *northern* and the *southern hemispheres*; and every point of that circle will be equally distant from the *poles*, or ends of the axis in the sphere. That pole which is in the middle of the northern hemisphere, will be called the *north pole of the sphere*; and that which is in the middle of the southern hemisphere, the *south pole*.

If another grand circle be drawn upon the sphere in such a manner as to cut the equinoctial at an angle of $23\frac{1}{2}$ degrees in two opposite points, it will represent the *ecliptic*, or circle of the sun's apparent annual motion; one half of which is on the north side of the equinoctial, and the other half on the south.

If a large stud be made to move eastward in this ecliptic in such a manner as to go quite round it in the time that the sphere is turned round westward 366 times upon its axis, this stud will represent the sun changing his place every day a 365th part of the ecliptic, and going round westward the same way as the stars do; but with a motion so much slower than the motion of the stars, that they will make 366 revolutions about the axis of the sphere in the time that the sun makes only 365. During one half of these revolutions, the sun will be on the north side of the equinoctial; during the other half, on the south; and at the end of each half, in the equinoctial.

If we suppose the terrestrial globe in this machine to be about one inch in diameter, and the diameter of the starry sphere to be about five or six feet, a small insect on the globe would see only a very little portion of its surface; but it would see one half of the starry sphere, the convexity of the globe hiding the other half from its view. If the sphere be turned westward round the globe, and the insect could judge of the appearances which arise from that motion, it would see some stars rising to its view in the eastern side of the sphere, whilst others were setting on the western: but as all the stars are fixed to the sphere, the same stars would always rise in the same points of view on the east side, and set in the same points of view on the west side. With the sun it would be otherwise; because the sun is not fixed to any point of the sphere, but moves slowly along an oblique circle in it. And if the insect should look towards the south, and call that point of the globe, where the equinoctial in the sphere seems to cut it on the left side, the east point; and where it cuts the globe on the right side, the west point; the little animal would see the sun rise north of the east, and set north of the west, for 182½ revolutions; after which, for as many more, the sun would rise south of the east, and set south of the west. And in the whole 365 revolutions, the sun would rise only twice in the east point, and set twice in the west. All these appearances would be the same, if the starry sphere stood still (the sun only moving in the ecliptic), and the earthly globe were turned round the axis of the sphere eastward. For, as the insect would be carried round with the globe, he would be quite insensible of its motion, and the sun and stars would appear to move westward.

1. Description of the Terrestrial Globe.

THE equator, ecliptic, and tropics, polar circles, and meridians, are laid down upon the globe in the manner already described. The ecliptic is divided into 12 signs, and each sign into 30 degrees. Each tropic is $23\frac{1}{2}$ degrees from the equator, and each polar circle $23\frac{1}{2}$ degrees from its respective pole. Circles are drawn parallel to the equator, at every 10 degrees distance from it on each side to the poles: these circles are called *parallels of latitude*. On large globes there are circles drawn perpendicularly through every tenth degree of the equator, intersecting each other at the poles: but on globes of or under a foot diameter, they are only drawn through every fifteenth degree of the equator; these circles are generally called *meridians*, sometimes *circles of longitude*, and at other times *hour-circles*.

The globe is hung in a brass-ring (A), called the *brazen meridian*, and turns upon a wire in each pole sunk half its thickness into one side of the meridian ring; by which means that side of the ring divides the globe into two equal parts, called the *eastern* and *western hemispheres*; as the equator divides it into two equal parts, called the *northern* and *southern hemispheres*. The ring is divided into 360 equal parts or degrees, on the side wherein the axis of the globe turns. One half of these degrees are numbered, and reckoned, from the equator to the poles, where they end at 90: their use is to show the latitudes of places. The degrees on the other half of the meridian are numbered from the poles to the equator, where they end at 90: their use is to show how to elevate either the north or south pole above the horizon, according to the latitude of any given place, as it is north or south of the equator.

The brazen meridian is let into two notches made in a broad flat ring called the *wooden horizon*, B, C; the upper surface of which divides the globe into two equal parts, called the *upper* and *lower hemispheres*. One notch is in the north point of the horizon, and the other in the south. On this horizon are several concentric circles, which contain the months and days of the year, the signs and degrees answering to the sun's place for each month and day, and the 32 points of the compass and the circles of amplitude and azimuth.—The graduated side of the brazen meridian lies towards the east side of the horizon, and should be generally kept towards the person who works problems by the globes.

There is a small horary circle D, so fixed to the north part of the brazen meridian, that the wire in the north pole of the globe is in the centre of that circle; and on the wire is an index, which goes over all the 24 hours of the circle, as the globe is turned round its axis. Sometimes there are two horary circles, one between each pole of the globe and the brazen meridian.

There is a thin slip of brass, called the *quadrant of altitude*, which is divided into 90 equal parts or degrees, answering exactly to so many degrees of the equator. It is occasionally fixed to the uppermost point of the brazen meridian by a nut and screw. The divisions end at the nut E, and the quadrant is turned round upon it.

There is also applied occasionally to the globe a magnetic needle, freely moving over a circle divided into

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The terrestrial globe described.
Plate CCX fig. 1.

into four times 90 degrees; reckoning from the north and south points towards the east and west, and also into the 32 points of the compass. As this needle makes nearly a certain constant angle with the meridian in every place, called the *variation*; therefore this compass being added to the frame, will rectify the position of the meridian of the globe when the variation of the needle is known. Thus at London, the variation of the needle is at this time about 23 degrees northward; therefore, by moving the frame of the globe about till the needle settles itself over the 23d degree, reckoning westward from the north point or *flour de lis*, we shall have the brass meridian coinciding with the true meridian. The compass is sometimes fixed between the legs underneath the globe.

2. Description and Use of the Armillary Sphere.

THE exterior parts of this machine are, a compages of brass rings, which represent the principal circles of the heaven, viz. 1. The equinoctial AA, which is divided into 360 degrees (beginning at its intersection with the ecliptic in Aries), for showing the sun's right ascension in degrees; and also into 24 hours, for showing his right ascension in time. 2. The ecliptic BB, which is divided into 12 signs, and each sign into 30 degrees, and also into the months and days of the year; in such a manner, that the degree or point of the ecliptic in which the sun is, on any given day, stands over that day in the circle of months. 3. The tropic of Cancer CC, touching the ecliptic at the beginning of Cancer in *e*, and the tropic of Capricorn DD, touching the ecliptic at the beginning of Capricorn in *f*; each 23½ degrees from the equinoctial circle. 4. The arctic circle E, and the antarctic circle F, each 23½ degrees from its respective pole at N and S. 5. The equinoctial colure GG, passing through the north and south poles of the heaven at N and S, and through the equinoctial points Aries and Libra, in the ecliptic. 6. The solstitial colure HH, passing through the poles of the heaven, and through the solstitial points Cancer and Capricorn in the ecliptic. Each quarter of the former of these colures is divided into 90 degrees, from the equinoctial to the poles of the world, for showing the declination of the sun, moon, and stars; and each quarter of the latter, from the ecliptic at *e* and *f*, to its poles *b* and *d*, for showing the latitude of the stars.

In the north pole of the ecliptic is a nut *b*, to which is fixed one end of a quadrantal wire, and to the other end a small sun Y, which is carried round the ecliptic BB, by turning the nut: and in the south pole of the ecliptic is a pin *d*, on which is another quadrantal wire, with a small moon Z upon it, which may be moved round by the hand: but there is a particular contrivance for causing the moon to move in an orbit which crosses the ecliptic at an angle of 5½ degrees, in two opposite points called the *moon's nodes*; and also for shifting these points backward in the ecliptic, as the moon's nodes shift in the heaven.

Within these circular rings is a small terrestrial globe I, fixed on an axis KK, which extends from the north and south poles of the globe at *n* and *s*, to those of the celestial sphere at N and S. On this axis is fixed the flat celestial meridian LL, which may be set directly over the meridian of any place on the globe,

and then turned round with the globe, so as to keep over the same meridian upon it. This flat meridian is graduated the same way as the brass meridian of a common globe, and its use is much the same. To this globe is fitted the moveable horizon MM, so as to turn upon two strong wires proceeding from its east and west points to the globe, and entering the globe at the opposite points of its equator, which is a moveable brass ring let into the globe in a groove all around its equator. The globe may be turned by hand within this ring, so as to place any given meridian upon it, directly under the celestial meridian LL. The horizon is divided into 360 degrees all around its outermost edge, within which are the points of the compass for showing the amplitude of the sun and moon both in degrees and points. The celestial meridian LL, passes thro' two notches in the north and south points of the horizon, as in a common globe: but here, if the globe be turned round, the horizon and meridian turn with it. At the south pole of the sphere is a circle of 24 hours, fixed to the rings; and on the axis is an index which goes round that circle, if the globe be turned round its axis.

The whole fabric is supported on a pedestal N, and may be elevated or depressed upon the joint O, to any number of degrees from 0 to 90, by means of the arc P, which is fixed in the strong brass arm Q, and slides in the upright piece R, in which is a screw at *r*, to fix it at any proper elevation.

In the box T are two wheels (as in Dr Long's sphere), and two pinions, whose axes come out at V and U; either of which may be turned by the small winch W. When the winch is put upon the axis V, and turned backward, the terrestrial globe, with its horizon and celestial meridian, keep at rest; and the whole sphere of circles turns round from east, by south, to west, carrying the sun Y, and moon Z, round the same way, and causing them to rise above and set below the horizon. But when the winch is put upon the axis U, and turned forward, the sphere with the sun and moon keep at rest; and the earth, with its horizon and meridian, turn round from west, by south, to east; and bring the same points of the horizon to the sun and moon, to which these bodies came when the earth kept at rest and they were carried round it, showing that they rise and set in the same points of the horizon, and at the same times in the hour-circle, whether the motion be in the earth or in the heaven. If the earthly globe be turned, the hour-index goes round its hour-circle; but if the sphere be turned, the hour-circle goes round below the index.

And so, by this construction, the machine is equally fitted to show either the real motion of the earth or the apparent motion of the heaven.

To rectify the sphere for use, first slacken the screw *r* in the upright stem R, and taking hold of the arm Q, move it up or down until the given degree of latitude for any place be at the side of the stem R; and then the axis of the sphere will be properly elevated so as to stand parallel to the axis of the world, if the machine be set north and south by a small compass: this done, count the latitude from the north pole, upon the celestial meridian LL, down towards the north notch of the horizon, and set the horizon to that latitude; then turn the nut *b* until the sun Y comes to

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the given day of the year in the ecliptic, and the sun will be at its proper place for that day: find the place of the moon's ascending node, and also the place of the moon, by an ephemeris, and set them right accordingly: lastly, turn the winch W, until either the sun comes to the meridian LL, or until the meridian comes to the sun (according as you want the sphere or earth to move), and set the hour-index to the XII, marked noon, and the whole machine will be rectified. Then turn the winch, and observe when the sun or moon rise and set in the horizon, and the hour-index will show the times thereof for the given day.

As those who understand the use of the globes will be at no loss to work many other problems by this sphere, it is needless to enlarge any farther upon it.

3. Directions for using Globes.

In using globes, keep the east side of the horizon towards you (unless the problem requires the turning of it), which side you may know by the word East upon the horizon; for then you have the graduated side of the meridian towards you, the quadrant of altitude before you, and the globe divided exactly into two equal parts, by the graduated side of the meridian.

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Directions
for using
the ter-
restrial globe.

In working some problems, it will be necessary to turn the whole globe and horizon about, that you may look on the west side thereof; which turning will be apt to jog the ball so, as to shift away that degree of the globe which was before set to the horizon or meridian: to avoid which inconvenience, you may thrust in the feather-end of a quill between the ball of the globe and the brazen meridian; which, without hurting the ball, will keep it from turning in the meridian, whilst you turn the west side of the horizon towards you.

PROB. I. *To find the latitude and longitude of any given place upon the globe.*—Turn the globe on its axis, until the given place comes exactly under that graduated side of the brazen meridian on which the degrees are numbered from the equator; and observe what degree of the meridian the place then lies under; which is its latitude, north or south, as the place is north or south of the equator.

The globe remaining in this position, the degree of the equator, which is under the brazen meridian, is the longitude of the place, which is east or west, as the place lies on the east or west side of the first meridian of the globe.—All the Atlantic ocean, and America, is on the west side of the meridian of London; and the greatest part of Europe, and of Africa, together with all Asia, is on the east side of the meridian of London, which is reckoned the first meridian of the globe by the British geographers and astronomers.

PROB. II. *The longitude and latitude of a place being given, to find that place on the globe.*—Look for the given longitude in the equator (counting it eastward or westward from the first meridian, as it is mentioned to be east or west); and bringing the point of longitude in the equator to the brazen meridian, on that side which is above the south point of the horizon: then count from the equator, on the brazen meridian, to the degree of the given latitude, towards the north or south pole, according as the latitude is north or south;

and under that degree of latitude on the meridian you will have the place required.

PROB. III. *To find the difference of longitude, or difference of latitude, between any two given places.*—Bring each of these places to the brazen meridian, and see what its latitude is: the lesser latitude subtracted from the greater, if both places are on the same side of the equator, or both latitudes added together if they are on different sides of it, is the difference of latitude required. And the number of degrees contained between these places, reckoned on the equator, when they are brought separately under the brazen meridian, is their difference of longitude, if it be less than 180; but if more, let it be subtracted from 360, and the remainder is the difference of longitude required. Or,

Having brought one of the places to the brazen meridian, and set the hour-index to XII, turn the globe until the other place comes to the brazen meridian; and the number of hours and parts of an hour, passed over by the index, will give the longitude in time; which may be easily reduced to degrees, by allowing 15 degrees for every hour, and one degree for every four minutes.

N. B. When we speak of bringing any place to the brazen meridian, it is the graduated side of the meridian that is meant.

PROB. IV. *Any place being given, to find all those places that have the same longitude or latitude with it.*—Bring the given place to the brazen meridian; then all those places which lie under that side of the meridian, from pole to pole, have the same longitude with the given place. Turn the globe round its axis; and all those places which pass under the same degree of the meridian that the given place does, have the same latitude with that place.

Since all latitudes are reckoned from the equator, and all longitudes are reckoned from the first meridian, it is evident, that the point of the equator which is cut by the first meridian, has neither latitude nor longitude.—The greatest latitude is 90 degrees, because no place is more than 90 degrees from the equator: And the greatest longitude is 180 degrees, because no place is more than 180 degrees from the first meridian.

PROB. V. *To find the antæci, periæci, and antipodes, of any given place.*—Bring the given place to the brazen meridian; and having found its latitude, keep the globe in that situation, and count the same number of degrees of latitude from the equator towards the contrary pole; and where the reckoning ends, you have the *antæci* of the given place upon the globe. Those who live at the equator have no *antæci*.

The globe remaining in the same position, set the hour-index to the upper XII on the horary circle, and turn the globe until the index comes to the lower XII; then the place which lies under the meridian, in the same latitude with the given place, is the *periæci* required. Those who live at the poles have no *periæci*.

As the globe now stands (with the index at the lower XII), the *antipodes* of the given place will be under the same point of the brazen meridian where its *antæci* stood before. Every place upon the globe has its *antipodes*.

PROB. VI. *To find the distance between any two places*

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places on the globe.—Lay the graduated edge of the quadrant of altitude over both the places, and count the number of degrees intercepted between them on the quadrant; then multiply these degrees by 60, and the product will give the distance in geographical miles: but to find the distance in miles, multiply the degrees by $69\frac{1}{2}$, and the product will be the number of miles required. Or, take the distance betwixt any two places with a pair of compasses, and apply that extent to the equator; the number of degrees, intercepted between the points of the compasses, is the distance in degrees of a great circle: which may be reduced either to geographical miles, or to English miles, as above.

PROB. VII. *A place on the globe being given, and its distance from any other place; to find all the other places upon the globe which are at the same distance from the given place.*—Bring the given place to the brazen meridian, and screw the quadrant of altitude to the meridian directly over that place; then keeping the globe in that position, turn the quadrant quite round upon it, and the degree of the quadrant that touches the second place will pass over all the other places which are equally distant with it from the given place.

This is the same as if one foot of a pair of compasses was set in the given place, and the other foot extended to the second place, whose distance is known; for if the compasses be then turned round the first place as a centre, the moving foot will go over all those places which are at the same distance with the second from it.

PROB. VIII. *The hour of the day at any place being given, to find all those places where it is noon at that time.*—Bring the given place to the brazen meridian, and set the index to the given hour; this done, turn the globe until the index points to the upper XII, and then all the places that lie under the brazen meridian have noon at that time.

N. B. The upper XII always stands for noon; and when the bringing of any place to the brazen meridian is mentioned, the side of that meridian on which the degrees are reckoned from the equator is meant, unless the contrary side be mentioned.

PROB. IX. *The hour of the day at any place being given, to find what o'clock it then is at any other place.*—Bring the given place to the brazen meridian, and set the index to the given hour; then turn the globe, until the place where the hour is required comes to the meridian, and the index will point out the hour at that place.

PROB. X. *To find the sun's place in the ecliptic, and his declination, for any given day of the year.*—Look on the horizon for the given day, and right against it you have the degree of the sign in which the sun is (or his place) on that day at noon. Find the same degree of that sign in the ecliptic line upon the globe, and having brought it to the brazen meridian, observe what degree of the meridian stands over it; for that is the sun's declination, reckoned from the equator.

PROB. XI. *The day of the month being given, to find all those places of the earth over which the sun will pass vertically on that day.*—Find the sun's place in the ecliptic for the given day, and having brought it to

the brazen meridian, observe what point of the meridian is over it; then, turning the globe round its axis, all those places which pass under that point of the meridian are the places required; for as their latitude is equal, in degrees and parts of a degree, to the sun's declination, the sun must be directly over-head to each of them at its respective noon.

PROB. XII. *A place being given in the torrid zone, to find those two days of the year on which the sun shall be vertical to that place.*—Bring the given place to the brazen meridian, and mark the degree of latitude that is exactly over it on the meridian; then turn the globe round its axis, and observe the two degrees of the ecliptic which pass exactly under that degree of latitude: lastly, find on the wooden horizon the two days of the year in which the sun is in those degrees of the ecliptic, and they are the days required: for on them, and none else, the sun's declination is equal to the latitude of the given place; and, consequently, he will then be vertical to it at noon.

PROB. XIII. *To find all those places of the north frigid zone, where the sun begins to shine constantly without setting, on any given day, from the 21st of March to the 23d of September.*—On these two days, the sun is in the equinoctial, and enlightens the globe exactly from pole to pole: therefore, as the earth turns round its axis, which terminates in the poles, every place upon it will go equally through the light and the dark, and so make the day and night equal to all places of the earth. But as the sun declines from the equator, towards either pole, he will shine just as many degrees round that pole as are equal to his declination from the equator: so that no place within that distance of the pole will then go through any part of the dark, and consequently the sun will not set to it. Now, as the sun's declination is northward from the 21st of March to the 23d of September, he must constantly shine round the north pole all that time; and on the day that he is in the northern tropic, he shines upon the whole north frigid zone; so that no place within the north polar circle goes through any part of the dark on that day. Therefore,

Having brought the sun's place for the given day to the brazen meridian, and found his declination (by Prob. IX.) count as many degrees on the meridian, from the north pole, as are equal to the sun's declination from the equator, and mark that degree from the pole where the reckoning ends; then turning the globe round its axis, observe what places in the north frigid zone pass directly under that mark; for they are the places required.

The like may be done for the south frigid zone, from the 23d of September to the 21st of March, during which time the sun shines constantly on the south pole.

PROB. XIV. *To find the place over which the sun is vertical at any hour of a given day.*—Having found the sun's declination for the given day (by Prob. X.) mark it with a chalk on the brazen meridian: then bring the place where you are (suppose Edinburgh) to the brazen meridian, and set the index to the given hour; which done, turn the globe on its axis, until the index points to XII at noon; and the place on the globe, which is then directly under the point of the

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the sun's declination marked upon the meridian, has the sun that moment in the zenith, or directly over head.

PROB. XV. *The day and hour of a lunar eclipse being given; to find all those places of the earth to which it will be visible.*—The moon is never eclipsed but when she is full, and so directly opposite to the sun, that the earth's shadow falls upon her. Therefore, whatever place of the earth the sun is vertical to at that time, the moon must be vertical to the antipodes of that place: so that the sun will be then visible to one half of the earth, and the moon to the other.

Find the place to which the sun is vertical at the given hour (by Prob. XIV.) elevate the pole to the latitude of that place, and bring the place to the upper part of the brazen meridian, as in the former problem: then, as the sun will be visible to all those parts of the globe which are above the horizon, the moon will be visible to all those parts which are below it, at the time of her greatest obscuration.

PROB. XVI. *To rectify the globe for the latitude, the zenith, and the sun's place.*—Find the latitude of the place (by Prob. I.) and if the place be in the northern hemisphere, raise the north pole above the north point of the horizon, as many degrees (counted from the pole upon the brazen meridian) as are equal to the latitude of the place. If the place be in the southern hemisphere, raise the south pole above the south point of the horizon as many degrees as are equal to the latitude. Then, turn the globe till the place comes under its latitude on the brazen meridian, and fasten the quadrant of altitude so, that the chamfered edge of its nut (which is even with the graduated edge) may be joined to the zenith, or point of latitude. This done, bring the sun's place in the ecliptic for the given day (found by Prob. X.) to the graduated side of the brazen meridian, and set the hour-index to XII at noon, which is the uppermost XII on the hour-circle; and the globe will be rectified.

PROB. XVII. *The latitude of any place, not exceeding $66\frac{1}{2}$ degrees, and the day of the month, being given; to find the time of the sun's rising and setting, and consequently the length of the day and night.*—Having rectified the globe for the latitude, and for the sun's place on the given day (as directed in the preceding problem), bring the sun's place in the ecliptic to the eastern side of the horizon, and the hour-index will show the time of sun-rising; then turn the globe on its axis, until the sun's place comes to the western side of the horizon, and the index will show the time of sun-setting.

The hour of sun-setting doubled, gives the length of the day; and the hour of sun-rising doubled, gives the length of the night.

PROB. XVIII. *The latitude of any place, and the day of the month, being given; to find when the morning twilight begins, and the evening twilight ends, at that place.*—This problem is often limited: for, when the sun does not go 18 degrees below the horizon, the twilight continues the whole night; and for several nights together in summer, between 49 and $66\frac{1}{2}$ degrees of latitude; and the nearer to $66\frac{1}{2}$, the greater is the number of these nights. But when it does begin and end, the following method will show the time for any given day.

Rectify the globe, and bring the sun's place in the
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ecliptic to the eastern side of the horizon; then mark with a chalk that point of the ecliptic which is in the western side of the horizon, it being the point opposite to the sun's place: this done, lay the quadrant of altitude over the said point, and turn the globe eastward, keeping the quadrant at the chalk mark, until it is just 18 degrees high on the quadrant; and the index will point out the time when the morning twilight begins: for the sun's place will then be 18 degrees below the eastern side of the horizon. To find the time when the evening twilight ends, bring the sun's place to the western side of the horizon; and the point opposite to it, which was marked with the chalk, will be rising in the east: then, bring the quadrant over that point, and keeping it thereon, turn the globe westward, until the said point be 18 degrees above the horizon on the quadrant, and the index will show the time when the evening twilight ends; the sun's place being then 18 degrees below the western side of the horizon.

PROB. XIX. *To find on what day of the year the sun begins to shine constantly, without setting, on any given place in the north frigid zone; and how long he continues to do so.*—Rectify the globe to the latitude of the place, and turn it about until some point of the ecliptic, between Aries and Cancer, coincides with the north point of the horizon where the brazen meridian cuts it; then find, on the wooden horizon, what day of the year the sun is in that point of the ecliptic; for that is the day on which the sun begins to shine constantly on the given place without setting. This done, turn the globe, until some point of the ecliptic, between Cancer and Libra, coincides with the north point of the horizon, where the brazen meridian cuts it; and find, on the wooden horizon, on what day the sun is in that point of the ecliptic; which is the day that the sun leaves off constantly shining on the said place, and rises and sets to it as to other places on the globe. The number of natural days, or complete revolutions of the sun about the earth, between the two days above found, is the time that the sun keeps constantly above the horizon without setting: for all that portion of the ecliptic, which lies between the two points which intersect the horizon in the very north, never sets below it; and there is just as much of the opposite part of the ecliptic that never rises: therefore, the sun will keep as long constantly below the horizon in winter as above it in summer.

PROB. XX. *To find in what latitude the sun shines constantly without setting, for any length of time less than $182\frac{1}{2}$ of our days and nights.*—Find a point in the ecliptic half as many degrees from the beginning of Cancer (either toward Aries or Libra) as there are natural days in the time given; and bring that point to the north side of the brazen meridian, and which the degrees are numbered from the pole towards the equator: then keep the globe from turning on its axis, and slide the meridian up or down until the foresaid point of the ecliptic comes to the north point of the horizon, and then the elevation of the pole will be equal to the latitude required.

PROB. XXI. *The latitude of a place, not exceeding $66\frac{1}{2}$ degrees, and the day of the month, being given; to find the sun's amplitude or point of the compass on which he rises or sets.*—Rectify the globe, and bring the sun's place

place to the eastern side of the horizon; then observe what point of the compass on the horizon stands right against the sun's place, for that is his amplitude at rising. This done, turn the globe westward, until the sun's place comes to the western side of the horizon, and it will cut the point of his amplitude at setting. Or, you may count the rising amplitude in degrees, from the east point of the horizon, to that point where the sun's place cuts it; and the setting amplitude from the west point of the horizon, to the sun's place at setting.

PROB. XXII. *The latitude, the sun's place, and his altitude, being given; to find the hour of the day, and the sun's azimuth, or number of degrees that he is distant from the meridian.*—Rectify the globe, and bring the sun's place to the given height upon the quadrant of altitude; on the eastern side of the horizon, if the time be in the forenoon; or the western side, if it be in the afternoon: then the index will show the hour; and the number of degrees in the horizon, intercepted between the quadrant of altitude and the south point, will be the sun's true azimuth at that time.

PROB. XXIII. *The latitude, hour of the day, and the sun's place, being given; to find the sun's altitude and azimuth.*—Rectify the globe, and turn it until the index points to the given hour; then lay the quadrant of altitude over the sun's place in the ecliptic, and the degree of the quadrant cut by the sun's place is his altitude at that time above the horizon; and the degree of the horizon cut by the quadrant is the sun's azimuth, reckoned from the south.

PROB. XXIV. *The latitude, the sun's altitude, and his azimuth, being given; to find his place in the ecliptic, the day of the month, and hour of the day, though they had all been lost.*—Rectify the globe for the latitude and zenith, and set the quadrant of altitude to the given azimuth in the horizon; keeping it there, turn the globe on its axis until the ecliptic cuts the quadrant in the given altitude: that point of the ecliptic which cuts the quadrant there, will be the sun's place; and the day of the month answering thereto, will be found over the like place of the sun on the wooden horizon. Keep the quadrant of altitude in that position; and, having brought the sun's place to the brazen meridian, and the hour-index to XII at noon, turn back the globe, until the sun's place cuts the quadrant of altitude again, and the index will show the hour.

Any two points of the ecliptic, which are equidistant from the beginning of Cancer or of Capricorn, will have the same altitude and azimuth at the same hour, though the months be different; and therefore it requires some care in this problem, not to mistake both the month and the day of the month; to avoid which, observe, that from the 20th of March to the 21st of June, that part of the ecliptic which is between the beginning of Aries and beginning of Cancer is to be used; from the 21st of June to the 23d of September, between the beginning of Cancer and beginning of Libra; from the 23d of September to the 21st of December, between the beginning of Libra and the beginning of Capricorn; and from the 21st of December to the 20th of March, between the beginning of Capricorn and beginning of Aries. And as one can never be at a loss to know in what quarter of the year he takes the sun's altitude and

azimuth, the above caution with regard to the quarters of the ecliptic will keep him right as to the month and day thereof.

PROB. XXV. *To find the length of the longest day at any given place.*—If the place be on the north side of the equator, find its latitude (by Prob. I.) and elevate the north pole to that latitude; then, bring the beginning of Cancer to the brazen meridian, and set the hour-index to XII at noon. But if the given place be on the south side of the equator, elevate the south pole to its latitude, and bring the beginning of Capricorn to the brazen meridian, and the hour-index to XII. This done, turn the globe westward, until the beginning of Cancer or Capricorn (as the latitude is north or south) comes to the horizon; and the index will then point out the time of sun-setting, for it will have gone over all the afternoon hours, between mid-day and sun-set; which length of time being doubled, will give the whole length of the day from sun rising to sun-setting. For, in all latitudes, the sun rises as long before mid-day, as he sets after it.

PROB. XXVI. *To find in what latitude the longest day is, of any given length, less than 24 hours.*—If the latitude be north, bring the beginning of Cancer to the brazen meridian, and elevate the north pole to about $66\frac{1}{2}$ degrees; but if the latitude be south, bring the beginning of Capricorn to the meridian, and elevate the south pole to about $66\frac{1}{2}$ degrees; because the longest day in north latitude is, when the sun is in the first point of Cancer; and in south latitude, when he is in the first point of Capricorn. Then set the hour-index to XII at noon, and turn the globe westward, until the index points at half the number of hours given; which done, keep the globe from turning on its axis, and slide the meridian down in the notches, until the aforesaid point of the ecliptic (viz. Cancer or Capricorn) comes to the horizon; then, the elevation of the pole will be equal to the latitude required.

PROB. XXVII. *The latitude of any place, not exceeding $66\frac{1}{2}$ degrees, being given; to find in what climate the place is.*—Find the length of the longest day at the given place, by Prob. XXV. and whatever be the number of hours whereby it exceedeth twelve, double that number, and the sun will give the climate in which the place is.

PROB. XXVIII. *The latitude, and the day of the month, being given; to find the hour of the day when the sun shines.*—Set the wooden horizon truly level, and the brazen meridian due north and south by a mariner's compass; then, having rectified the globe, stick a small sewing-needle into the sun's place in the ecliptic, perpendicular to that part of the surface of the globe; this done, turn the globe on its axis, until the needle comes to the brazen meridian, and set the hour-index to XII at noon; then, turn the globe on its axis, until the needle points exactly towards the sun (which it will do when it casts no shadow on the globe), and the index will show the hour of the day.

4. The Use of the Celestial Globe.

HAVING done for the present with the terrestrial globe, we shall proceed to the use of the celestial globe, How to use
first premising, that as the equator, ecliptic, tropics, the celestial
polar globe.

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tude of the
stars.

polar circles, horizon, and brazen meridian, are exactly alike on both globes, all the former problems concerning the sun are solved the same way by both globes. The method also of rectifying the celestial globe is the same as rectifying the terrestrial. *N. B.* The sun's place for any day of the year stands directly over that day on the horizon of the celestial globe, as it does on that day of the terrestrial.

The latitude and longitude of the stars, or of all other celestial phenomena, are reckoned in a very different manner from the latitude and longitude of places on the earth: for all terrestrial latitudes are reckoned from the equator; and longitudes from the meridian of some remarkable place, as of London by the British, and of Paris by the French. But the astronomers of all nations agree in reckoning the latitudes of the moon, stars, planets, and comets, from the ecliptic; and their longitudes from the equinoctial colure, in that semicircle of it which cuts the ecliptic at the beginning of Aries; and thence eastward, quite round, to the same semicircle again. Consequently those stars which lie between the equinoctial and the northern half of the ecliptic, have north declination and south latitude; those which lie between the equinoctial and the southern half of the ecliptic, have south declination and north latitude; and all those which lie between the tropics and poles, have their declinations and latitudes of the same denomination.

There are six great circles on the celestial globe, which cut the ecliptic perpendicularly, and meet in two opposite points in the polar circles; which points are each ninety degrees from the ecliptic, and are called its poles. These polar points divide those circles into 12 semicircles; which cut the ecliptic at the beginnings of the twelve signs. They resemble so many meridians on the terrestrial globe: and as all places which lie under any particular meridian-semicircle on that globe have the same longitude; so all those points of the heaven, through which any of the above semicircles are drawn, have the same longitude.—And as the greatest latitudes on the earth are at the north and south poles of the earth, so the greatest latitudes in the heaven are at the north and south poles of the ecliptic.

For the division of the stars into constellations, &c. see ASTRONOMY, n^o 403, 406.

PROB. I. *To find the right ascension and declination of the sun, or any fixed star*—Bring the sun's place in the ecliptic to the brazen meridian: then that degree in the equinoctial which is cut by the meridian, is the sun's right ascension; and that degree of the meridian which is over the sun's place, is his declination. Bring any fixed star to the meridian, and its right ascension will be cut by the meridian in the equinoctial; and the degree of the meridian that stands over it is its declination.

So that right ascension and declination, on the celestial globe, are found in the same manner as longitude and latitude on the terrestrial.

PROB. II. *To find the latitude and longitude of any star*.—If the given star be on the north side of the ecliptic, place the 90th degree of the quadrant of altitude on the north pole of the ecliptic, where the 12 semicircles meet, which divide the ecliptic into the 12 signs; but if the star be on the south side of

the ecliptic, place the 90th degree of the quadrant on the south pole of the ecliptic: keeping the 90th degree of the quadrant on the proper pole, turn the quadrant about, until its graduated edge cuts the star: then the number of degrees in the quadrant, between the ecliptic and the star, is its latitude; and the degree of the ecliptic, cut by the quadrant, is the star's longitude, reckoned according to the sign in which the quadrant then is.

PROB. III. *To represent the face of the starry firmament, as seen from any given place of the earth, at any hour of the night*.—Rectify the celestial globe for the given latitude, the zenith, and sun's place in every respect, as taught by the XVIth problem for the terrestrial; and turn it about, until the index points to the given hour: then the upper hemisphere of the globe will represent the visible half of the heaven for that time; all the stars upon the globe being then in such situations, as exactly correspond to those in the heaven. And if the globe be placed duly north and south, by means of a small sea-compass, every star in the globe will point toward the like star in the heaven: by which means, the constellations and remarkable stars may be easily known. All those stars which are in the eastern side of the horizon, are then rising in the eastern side of the heaven; all in the western, are setting in the western side; and all those under the upper part of the brazen meridian, between the south point of the horizon and the north pole, are at their greatest altitude, if the latitude of the place be north; but if the latitude be south, those stars which lie under the upper part of the meridian, between the north point of the horizon and the south pole, are at their greatest altitude.

PROB. IV. *The latitude of the place, and day of the month, being given; to find the time when any known star will rise, or be upon the meridian, or set*.—Having rectified the globe, turn it about until the given star comes to the eastern side of the horizon, and the index will show the time of the star's rising; then turn the globe westward, and when the star comes to the brazen meridian, the index will show the time of the star's coming to the meridian of your place; lastly, turn on, until the star comes to the western side of the horizon, and the index will show the time of the star's setting. *N. B.* In northern latitudes, those stars which are less distant from the north pole than the quantity of its elevation above the north point of the horizon, never set; and those which are less distant from the south pole than the number of degrees by which it is depressed below the horizon, never rise: and vice versa in southern latitudes.

PROB. V. *To find at what time of the year a given star will be upon the meridian, at a given hour of the night*.—Bring the given star to the upper semicircle of the brass meridian, and set the index to the given hour; then turn the globe, until the index points to XII at noon, and the upper semicircle of the meridian will then cut the sun's place, answering to the day of the year sought; which day may be easily found against the like place of the sun among the signs on the wooden horizon.

PROB. VI. *The latitude, day of the month, and azimuth of any known star being given; to find the hour of the night*.—Having rectified the globe for the latitude, zenith,

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zenith, and sun's place, lay the quadrant of altitude to the given degree of azimuth in the horizon: then turn the globe on its axis, until the star comes to the graduated edge of the quadrant; and when it does, the index will point out the hour of the night.

PROB. VII. *The latitude of the place, the day of the month, and altitude of any known star, being given; to find the hour of the night.*—Rectify the globe as in the former problem, guess at the hour of the night, and turn the globe until the index points at the supposed hour: then lay the graduated edge of the quadrant of altitude over the known star; and if the degree of the star's height in the quadrant upon the globe answers exactly to the degree of the star's observed altitude in the heaven, you have guessed exactly: but if the star on the globe is higher or lower than it was observed to be in the heaven, turn the globe backwards or forwards, keeping the edge of the quadrant upon the star, until its centre comes to the observed altitude in the quadrant; and then the index will show the true time of the night.

PROB. VIII. *An easy method for finding the hour of the night by any two known stars, without knowing either their altitude or azimuth; and then of finding both their altitude and azimuth, and thereby the true meridian.*—Tie one end of a thread to a common musket bullet; and having rectified the globe as above, hold the other end of the thread in your hand, and carry it slowly round betwixt your eye and the starry heaven, until you find it cuts any two known stars at once. Then guessing at the hour of the night, turn the globe until the index points to that time in the hour circle; which done, lay the graduated edge of the quadrant over any one of these two stars on the globe which the thread cut in the heaven. If the said edge of the quadrant cuts the other star also, you have guessed the time exactly; but if it does not, turn the globe slowly backwards or forwards, until the quadrant (kept upon either star) cuts them both through their centres: and then the index will point out the exact time of the night; the degree of the horizon, cut by the quadrant, will be the true azimuth of both these stars from the south; and the stars themselves will cut their true altitudes in the quadrant. At which moment, if a common azimuth-compass be so set upon a floor or level pavement, that these stars in the heaven may have the same bearing upon it (allowing for the variation of the needle) as the quadrant of altitude has in the wooden horizon of the globe, a thread extended over the north and south points of that compass will be directly in the plane of the meridian: and if a line be drawn upon the floor or pavement, along the course of the thread, and an upright wire be placed in the southmost end of the line, the shadow of the wire will fall upon that line, when the sun is on the meridian, and shines upon the pavement.

PROB. IX. *To find the place of the moon, or of any planet; and thereby to show the time of its rising, southing, and setting.*—See in Parker's or Weaver's ephemeris the geocentric place of the moon or planet in the ecliptic, for the given day of the month; and according to its longitude and latitude, as shown by the ephemeris, mark the same with a chalk upon the globe. Then, having rectified the globe, turn it round its

axis westward; and as the said mark comes to the eastern side of the horizon, to the brazen meridian, and to the western side of the horizon, the index will show at what time the planet rises, comes to the meridian, and sets, in the same manner as it would do for a fixed star.

For an explanation of the harvest-moons by a globe, see ASTRONOMY, n 370.

For the equation of time, see ASTRONOMY, n° 383.

4. Description of the Modern Improvements applied to Globes.

GLOBES mounted in the common manner, and with their hour circles fixed on the meridian, although instructive instruments for explaining the first principles of geography and the spherical doctrine of astronomy, yet contain several defects; as they prevent any elevation of the north and south poles near to their axes, or the brazen meridian from being quite moveable round in the horizon. They do not show how all the phenomena illustrated by them arise from the motion of the earth; a matter of consequence to beginners: and they are only adapted to the present age; consequently do not serve accurately the purposes of chronology and history, which they might be made to do if the poles whereon they turn were contrived to move in a circle round those of the ecliptic, according to its present obliquity.

The late Mr John Senex F. R. S. invented a contrivance for remedying these defects, by fixing the poles of the diurnal motion to two shoulders or arms of brass at the distance of $23\frac{1}{2}$ deg. from the poles of the ecliptic. These shoulders are strongly fastened at the other end to an iron axis, which passes through the poles of the ecliptic, and is made to move round with a very stiff motion; so that when it is adjusted to any point of the ecliptic which the equator is made to intersect, the diurnal motion of the globe on its axis will not disturb it. When it is to be adjusted for any time, past or future, one of the brazen shoulders is brought under the meridian, and held fast to it with one hand, whilst the globe is turned about with the other; so that the point of the ecliptic which the equator is to intersect may pass under the 0 degree of the brazen meridian; then holding a pencil to that point, and turning the globe about, it will describe the equator according to its position at the time required; and transferring the pencil to $23\frac{1}{2}$ and $66\frac{1}{2}$ degrees on the brazen meridian, the tropics and polar circles will be so described for the same time. By this contrivance, the celestial globe may be so adjusted, as to exhibit not only the rising and setting of the stars in all ages and in all latitudes, but likewise the other phenomena that depend upon the motion of the diurnal axis round the annual axis. Senex's celestial globes, especially the two greatest, of 17 and 28 inches in diameter, have been constructed upon this principle; so that by means of a nut and screw, the pole of the equator is made to revolve about the pole of the ecliptic. Phil. Trans. N° 447. p. 201, 203. or Martyn's Abr. Vol. VIII. p. 217. and N° 493. art. 18. in Phil. Trans. Vol. XLVI. p. 290.

To represent the above phenomena in the most natural and easy manner, the late Mr B. Martin applied to Mr Senex's contrivance a moveable, equinoctial,

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and solstitial colure; a moveable equinoctial circle, and a moveable ecliptic; all so connected together as to represent those imaginary circles in the heavens for any age of the world.

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Mr Harris's
improvement.

Mr Joseph Harris, late assay-master of the mint, contrived to remedy the former of the defects above mentioned, by placing two horary circles under the meridian, one at each pole; these circles are fixed tight between two brass rollers placed about the axis, so that when the globe is turned they are carried round with it, the meridian serving as an index to cut the horary divisions. The globe in this state serves universally and readily for solving problems in north and south latitudes, and also in places near the equator; whereas in the common construction, the axis and horary circle prevent the brass meridian from being moveable quite round in the horizon. This globe is also adapted for showing how the vicissitudes of day and night, and the alteration of their lengths, are really occasioned by the motion of the earth: for this purpose, he divided the brass meridian at one of the poles into months and days, according to the sun's declination, reckoning from the pole. Therefore, by bringing the day of the month to the horizon, and rectifying the globe according to the time of the day, the horizon will represent the circle separating light and darkness; and the upper half of the globe, the illuminated hemisphere, the sun being in the zenith. Phil. Transf. No 456. p. 321. or Martyn's Abr. Vol. VIII. p. 352.

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Mr Adam's
additions.

Plate CCX.

The late Mr George Adam, mathematical instrument maker, has made some additional improvements in the construction of the globes. His globes, like others, are suspended at their poles in a strong brass circle NZÆS (see fig. 2. representing the celestial), and turn therein upon two iron pins, which form the axis. They have each a thin brass semicircle NHS moveable about these poles, with a small, thin, sliding, circle H thereon; which semicircle is divided into two quadrants of 90 degrees each, from the equator to both the poles. On the terrestrial globe this semicircle is a moveable meridian, and its small sliding circle, which is divided into a few points of the compass, is the visible horizon of any particular place to which it is set. On the celestial globe this semicircle is a moveable circle of declination, and its small annexed circle an artificial sun or planet. Each globe has a brass wire TWY placed at the limits of the crepusculum or twilight; which, together with the globe, is mounted in a wooden frame, supported by a neat pillar and claw-feet, with a magnetic needle in a compass-box marked M in the figure. On the strong brass circle of the terrestrial globe, and about $23\frac{1}{2}$ degrees on each side of the north pole, the days of each month are laid down according to the sun's declination; and this brass circle is so contrived, that the globe may be placed with the north and south poles in the plane of the horizon, and with the south pole elevated above it. The equator on the surface of either globe serves the purpose of the horary circle, by means of a semicircular wire placed in the plane of the equator (ÆF), carrying two indices (F); one on the east, the other on the west side of the strong brass circle; one of which is occasionally to be used to point out the time upon the

equator. In these globes, therefore, the indices being set to the particular time on the equator, the globes are turned round, and the indices point out the time by remaining fixed; whereas in the globes as generally mounted, the indices move over the horary circles while the globe is moving, and thus point out the change of time. For farther particulars of these globes, and the method of using them, Mr Adam's Treatise on their Construction and Use, &c. 1772, may be consulted.

The additions and alterations above mentioned, made by Mr Adam, may save trouble to a practitioner in the performance of a few complex problems, and render the globes more elegant and costly; but to a young beginner, the more simple the construction of the globes, the better will they be adapted to initiate him into the rationale and practice of the problems in general; and as such, the globes, as improved by the late Mr B. Martin and Mr Wright, described below, appear to have considerably the advantage in simplicity, and to obviate several material defects that attend the construction of the other globes. The chief of the defects in the old globes is, that the horary circle being screwed on the meridian at the north pole, prevents the elevation of the south pole; which is necessary for the performance of problems for all latitudes. In Mr Adam's, the semicircular wire ÆF preventing the equator being placed exactly in the horizon, or the poles in the zenith, the great distance of the strong brass circle NZÆS from the surface of the globe, on account of the brass semicircles, renders the solution of problems, which require the use of the strong circle, not very easy nor accurate.

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Mr Martin's improvement.

An easy and expeditious method of elevating the south pole of the terrestrial globe, and by which the new discoveries, tracks, &c. made of late years by Captain Cook and other eminent navigators in the south seas, may be clearly seen and traced by the eye over all the southern ocean, was made use of by Mr B. Martin in the construction of the following improvement.

There is a groove turned out on the back part of the brass meridian A (fig. 1.); and by unscrewing the nut of the hour circle D at the north pole, the circle is made to slide away to any other part of the meridian, as at G. The meridian is fixed or moveable at pleasure by a screw passing into the groove, through the piece or side of the notch in which it moves, on the bottom or nadir point: by properly loosening this screw, the meridian is free to move, and the globe with it, into any required position; but at the same time, it is confined within the notch of the brass-piece, and thereby the globe is prevented from falling out of the frame in any position thereof whatsoever. The hour-circle being removed, both the north and south poles of the globe may be placed in the horizon, and thereby form a right sphere, which the usual mounting of the globes does not admit of.

Also by this construction, the south pole may be elevated for all latitudes: for this purpose there is an hour-circle about the south pole between the meridian and the globe, which does not obstruct the sight of any land, none having been thereabouts discovered. Consequently the globe is thus equally useful for the

olution of all common geographical problems in the southern as in the northern hemisphere, and more extensively so than heretofore.

In this new method of mounting the globe, it may readily be converted into a *tellurian*; for as the globe cannot fall out of the frame, the horizon of the globe may be placed in a perpendicular position: then the sun's place in the ecliptic being brought to the meridian, and its declination found, the pole of the globe must be elevated to that declination; which may be done by means of the degrees cut on the outer edge of the meridian for that purpose. If a lighted candle be placed at a considerable distance, exactly the height of the centre of the globe, and in a line with the meridian, the globe will exhibit all the phenomena of our earth for that day; for in this case the horizon of the globe becomes the solar horizon, and divides the whole into the enlightened and dark hemispheres: therefore upon turning the globe about its axis from west to east, it will clearly appear that all places emerging out of the dark hemisphere into the luminous one, under the western part of the horizon, will see the sun then as rising; when they arrive at the meridian, it will be their noon; and when they descend into the dark hemisphere at the eastern part of the horizon, they will see the sun as setting.

When any place is under the meridian, set the hour-index to XII, and revolve the globe; then you will see the natural motion and position of that place at hours of the day; at what time the sun rises or sets to it; the length of the diurnal and nocturnal arches, or of day and night; at what places the sun does not rise and set at that time; and from whence the vicissitudes of the seasons throughout the year in all latitudes, &c. &c.

To give this experiment the best effect, the candle should be enclosed within a common dark lantern, and its light issue through a hole or lens made for that purpose.

On the outer part of the sliding hour-circle, at the north pole, are usually engraved the points of the compass; so that by bringing that circle centrally over any place on the globe, it will appear by inspection only upon what point of the compass any other place bears from it, and that all over the globe.

This method of the sliding hour-circle is equally applicable to the celestial globe. Mr G. Wright of London has yet farther simplified the construction of the hour-circles, and it is thereby rather less operose than Mr Martin's above mentioned. It consists of the following particulars: There are engraved on the globes two hour-circles, one at each of the poles; which are divided into a double set of 12 hours, as usual in the common brass ones, except that the hours are figured round both to the right and left (see fig. 3.). The hour-hand or index (A) is placed in such a manner under the brass meridian, as to be moveable at pleasure to any required part of the hour-circle, and yet remain there fixed during the revolution of the globe on its axis and is entirely independent of the poles of the globe. In this manner the motion of the globe round its axis, carrying the hour-circle, the fixed index serves to point out the time, the same as in the reverse way by Mr Martin's or other globes.

There is a small advantage by having the hour-circle

figured both ways, as one hour serves as a complement to XII for the other, and the time of sun rising and setting, and *vice versa*, may be both seen at the same time on the hour circle. In the problems generally to be performed, the inner circle is the circle of reckoning, and the outer one only the complement. Fig. 4. is a representation of the globe, with Mr Wright's improved hour-circle at C.

Mr William Jones, mathematical instrument maker, Holborn, who mounts globes according to the improvements above mentioned of Messrs Martin and Wright, applies a compass of a portable size to the east part of the wooden horizon circle of both globes (see F, fig. 1.), by a dove-tail slider on the lid of the compass-box; which method is found more convenient and ready in the performance of problems, than when fixed underneath the frame at their feet; and as it occasionally slides away from the globes, the compass becomes useful in other situations.

In order to the performance of the problems which relate to the altitudes and azimuths of celestial objects, Mr Smeaton, F. R. S. has made some improvements applicable to the celestial globe; and to give some idea of the construction, they may be described as follows: Instead of a thin flexible slip of brass, which generally accompanies the globes, called the *quadrant of altitude*, Mr Smeaton substitutes an arch of a circle of the same radius, breadth, and substance, as the brass meridian, divided into degrees, &c. similar to the divisions of that circle, and which, on account of its strength, is not liable to be bent out of the plane of a vertical circle, as usual with the common quadrant put to globes. That end of this circular arch at which the divisions begin, rests on the horizon, being filed off square to fit and rest steadily on it throughout its whole breadth; and the upper end of the arch is firmly attached, by means of an arm, to a vertical socket, in such a manner that when the lower end of the arch rests on the horizon, the lower end of this socket shall rest on the upper edge of the brass meridian, directly over the zenith of the globe. This socket is fitted to and ground with a steel-spindle of the same length, so that it will turn freely on it without shaking; and the steel-spindle has an apparatus attached to its lower end, by which it can be fastened in a vertical position to the brass meridian, with its centre directly over the zenith point of the globe. The spindle being fixed firmly in this position, and the socket which is attached to the circular arch put on to it, and so adjusted that the lower end of the arch just rests on and fits close to the horizon; it is evident that the altitude of any object above the horizon will be shown by the degree which it intersects on this arch, and its azimuth by that end of the arch which rests on the horizon.

Besides this improvement, Mr Smeaton directs to place the index which is usually fixed on one end of the axis to point out the hour, in such a manner that its upper surface may move in the plane of the hour-circle rather than above it, as it usually does. He files off the end of this index to a circular arch, of the same radius with the inner edge of the hour-circle, to which it is to fit very exactly; and a fine line is drawn on its upper surface to determine the time by, instead of the tapering point which is generally

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rally used. By these means half minutes may be distinguished, if the hour circle be four inches in diameter. Mr Smeaton also describes a contrivance for preventing the meridian from shifting after being rectified for the latitude of the place, and while the operator is engaged in adjusting other parts of the apparatus. But as the purpose which this is intended to answer appears to be much better performed by the turned groove on the meridian in Mr Martin's contrivance described above, we shall omit the particular description; and for farther explanations and figures of Mr Smeaton's improvements, refer the reader to the Phil. Transf. Vol. LXXIX, Part i.

For another improvement made to the celestial globe, by Mr Ferguson, see ASTRONOMY, n° 493, and fig. 187 of plate LXXXI.

Most of the above problems may also be performed by means of accurate maps; but this requires a great deal of calculation, which is often very troublesome. The Analemma, or Orthographic Projection, delineated on Plate CCXII. will solve many of the most curious; and with the assistance of the maps will be almost equivalent to a terrestrial globe. The parallel lines drawn on this figure represent the degrees of the sun's declination from the equator, whether north or south, amounting to $23\frac{1}{2}$ nearly. On these lines are marked the months and days which correspond to such and such declinations. The size of the figure does not admit of having every day of the year inserted; but by making allowance for the intermediate days, in proportion to the rest, the declination may be guessed at with tolerable exactness. The elliptical lines are designed to show the hours of sun-rising or sun-setting before or after six o'clock. As 60 minutes make an hour of time, a fourth part of the space between each of the hour-lines will represent 15 minutes; which the eye can readily guess at, and which is as great exactness as can be expected from any mechanical invention, or as is necessary to answer any common purpose. The circles drawn round the centre at the distance of $11\frac{1}{2}$ each, show the point of the compass on which the sun rises and sets, and on what point the twilight begins and ends.

In order to make use of this analemma, it is only necessary to consider, that, when the latitude of the place and the sun's declination are both north or both south, the sun rises before six o'clock, between the east and the elevated pole; that is, towards the north, if the latitude and declination are north; or towards the south, if the latitude and declination are south. Let us now suppose it is required to find the time of the sun's rising and setting, the length of the days and nights,

the time when the twilight begins and ends, and what point of the horizon the sun rises and sets on, for the Lizard point in England, Franckfort in Germany, or Abbeville in France, on the 30th of April. The latitude of these places by the maps will be found nearly 50° north. Place the moveable index so that its point may touch 50° on the quadrant of north latitude in the figure; then observe where its edge cuts the parallel line on which April 30th is wrote. From this reckon the hour-lines towards the centre, and you will find that the parallel-line is cut by the index nearly at the distance of one hour and 15 minutes. So the sun rises at one hour 15 minutes before six, or 45 minutes after four in the morning, and sets 15 minutes after seven in the evening. The length of the day is 14 hours 30 minutes. Observe how far the intersection of the edge of the index with the parallel of April 30th is distant from any of the concentric circles; which you will find to be a little beyond that marked two points of the compass; and this shows, that on the 30th of April the sun rises two points and somewhat more from the east towards the north, or a little to the northward of E. N. E. and sets a little to the northward of W. N. W. To find the beginning and ending of twilight, take from the graduated arch of the circle $17\frac{1}{2}$ degrees with a pair of compasses; move one foot of the compasses extended to this distance along the parallel for the 30th of April, till the other just touches the edge of the index, which must still point at 50. The place where the other foot rests on the parallel of April 30th, then denotes the number of hours before six at which the twilight begins. This is somewhat more than three hours and an half; which shows, that the twilight then begins soon after two in the morning, and likewise that it begins to appear near five points from the east towards the north. The uses of this analemma may be varied in a great number of ways; but the example just now given will be sufficient for the ingenious reader.—The small circles on the same plate, marked *Island*, *Promontory*, &c. are added in order to render the maps more intelligible, by showing how the different subjects are commonly delineated on them.

HAVING thus explained the use of the globes, and general principles of geography, we must refer to the Maps for the situation of each particular country, with regard to longitude, latitude, &c. and to the names of the countries as they occur in the order of the alphabet, for the most remarkable particulars concerning them.

GEOMANCY, **GEOMANTIA**, a kind of divination, performed by means of a number of little points, or dots, made on paper at random: and considering the various lines and figures, which those points present; and thence forming a pretended judgment of futurity, and deciding any question proposed.

The word is formed of the Greek *γῆ*, *terra*, "earth;" and *μαντεία*, "divination;" it being the ancient cus-

tom to cast little pebbles on the ground, and thence to form their conjectures; instead of the points afterwards made use of.

Polydore Virgil defines geomancy a kind of divination performed by means of clefts or chinks made in the ground; and takes the Persian Magi to have been the inventors thereof.

G E O M E T R Y

ORIGINALLY signified no more than the art of measuring the earth, or any distances or dimensions within it: but at present it denotes the science of magnitude in general; comprehending the doctrine and relations of whatever is susceptible of augmentation or diminution, considered in that light.

Hence to geometry may be referred the consideration not only of lines, surfaces, and solids; but also of time, velocity, number, weight, &c.

This science had its rise among the Egyptians, who were in a manner compelled to invent it, to remedy confusion which generally happened in their lands, from the inundations of the river Nile, which carried away all boundaries, and effaced all the limits of their possessions. Thus this invention, which at first consisted only in measuring the lands, that every person might have what belonged to him, was called *geometry*, or the art of measuring land; and it is probable that the draughts and schemes, which they were annually compelled to make, helped them to discover many excellent properties of these figures; which speculations continued to be gradually improved, and are so to this day.

From Egypt geometry passed into Greece; where it continued to receive new improvements in the hands of Thales, Pythagoras, Archimedes, Euclid, &c. The Elements of Geometry, written by this last in 15 books, are a most convincing proof to what perfection this science was carried among the ancients. However, it must be acknowledged, that it fell short of modern geometry; the bounds of which, what by the invention of fluxions, and the discovery of the almost infinite orders of curves, are greatly enlarged.

We may distinguish the progress of geometry into three ages; the first of which was in its meridian glory at the time when Euclid's Elements appeared; the second, beginning with Archimedes, reaches to the time of Des Cartes, who, by applying algebra to the elements of geometry, gave a new turn to this science, which has been carried to its utmost perfection by Sir Isaac Newton and Mr Leibnitz.

In treating this useful subject, we shall divide it into two parts; the first containing the general principles; and the second, the application of these principles to the mensuration of surfaces, solids, &c.

PART I. GENERAL PRINCIPLES OF GEOMETRY.

Art. 1. **A** POINT is that which is not made up of parts, or which is of itself indivisible.

2. A line is a length without breadth, as B—

3. The extremities of a line are points; as the extremities of the line AB, are the points A and B, fig. 1.

4. If the line AB be the nearest distance between its extremes A and B, then it is called a *straight line*, as AB; but if it be not the nearest distance, then it is called a *curve line*, as *ab*, fig. 1.

5. A surface is that which is considered as having only length and breadth, but no thickness, as fig. 2.

6. The terms or boundaries of a surface are lines.

7. A plain surface is that which lies equally between its extremes.

8. The inclination between two lines meeting one another (provided they do not make one continued line), or the opening between them, is called an *angle*; thus the inclination of the line AB to the line CB (fig. 3.) meeting one another at B, or the opening between the two lines AB and CB, is called an *angle*.

9. When the lines forming the angle are right lines, then it is called a *right-lined angle*, as fig. 4.; if one of them be right and the other curved, it is called a *mixed angle*, as fig. 5; if both of them be curved, it is called a *curve-lined angle*, as fig. 6.

10. If a right line AB fall upon another DC, (fig 7.) so as to incline neither to one side nor to the other, but make the angles ABD, ABC, on each side equal to one another; then the line AB is said to be *perpendicular* to the line DC, and the two angles are called *right-angles*.

11. An obtuse angle is that which is greater than a

right one, as fig. 8.; and an acute angle, that which is less than a right one, as fig. 9.

12. If a right line DC be fastened at one of its ends C, and the other end D be carried quite round, then the space comprehended is called a *circle*; the curve-line described by the point D, is called the *periphery* or *circumference* of the circle; the fixed point C is called the *centre* of it; fig. 10.

13. The describing line CD is called the *radius*, viz. any line drawn from the centre to the circumference; whence all radii of the same or equal circles are equal.

14. Any line drawn through the centre, and terminated both ways by the circumference, is called a *diameter*, as BD is a diameter of the circle BADE. And the diameter divides the circle and circumference into two equal parts, and is double the radius.

15. The circumference of every circle is supposed to be divided into 360 equal parts, called *degrees*; and each degree is divided into 60 equal parts, called *minutes*; and each minute into 60 equal parts, called *seconds*; and these into *thirds*, *fourths*, &c. these parts being greater or less according as the radius is.

16. Any part of the circumference is called an *arch*, or *arc*; and is called an arc of as many degrees as it contains parts of the 360, into which the circumference was divided: thus if AD be the $\frac{1}{8}$ of the circumference, then the arc AD is an arc of 45 degrees.

17. A line drawn from one end of an arc to the other, is called a *chord*, and is the measure of the arc: thus the right line AB is the chord of the arc ADB, fig. 11.

18. Any

18. Any part of a circle cut off by a circle, is called a *segment*; thus the space comprehended between the chord AB and circumference ADB (which is cut off by the chord AB) is called a *segment*. Whence it is plain,

1st, That all chords divide the circle into two segments.

2^{dly}, The less the chord is, the more unequal are the segments, and *e contra*.

3^{dly}, When the chord is greatest, viz. when it is a diameter, then the segments are equal, viz. each a semicircle.

19. Any part of a circle (less than a semicircle) contained between two radii and an arc, is called a *sector*; thus the space contained between the two radii, AC, BC, and the arc AB, is called the *sector*, fig. 12.

20. The right line of any arc, is a line drawn perpendicular from one end of the arc, to a diameter drawn through the other end of the same arc; thus (fig. 13.) AD is the right line of the arc AB, it being a line drawn from A, the one end of the arc AB, perpendicular to CB, a diameter passing through B, the other end of the arc AB.

Now the lines standing on the same diameter, still increase till they come to the centre, and then becoming the radius, it is plain that the radius EC is the greatest possible line, and for that reason it is called the *whole sine*.

Since the whole sine EC must be perpendicular to the diameter FB (by def. 20.), therefore producing the diameter EG, the two diameters FB, EG, must cross one another at right angles, and so the circumference of the circle must be divided by them into four parts, EB, BG, GF, and FE, and these four parts are equal to one another (by def. 10.) and so EB a quadrant, or fourth part of the circumference; therefore the radius EC is always the sine of the quadrant, or fourth part of the circle EB.

Sines are said to be of so many degrees, as the arc contains parts of the 360, into which the circumference is supposed to be divided; so the radius being the sine of a quadrant, or fourth part of the circumference, which contains 90 degrees (the fourth part of 360), therefore the radius must be the sine of 90 degrees.

21. The part of the radius comprehended between the extremity of the right sine and the lower end of the arc, viz. DB, is called the *versed sine* of the arc AB.

22. If to any point in the circumference, viz. B, there be drawn a diameter FCB, and from the point B, perpendicular to that diameter, there be drawn the line BH; that line is called a *tangent* to the circle in the point B; which tangent can touch the circle only in one point B, else if it touched it in more, it would go within it, and so not be a tangent but a chord, (by art 17.)

23. The tangent of any arc AB, is a right line drawn perpendicular to a diameter through the one end of the arc B, and terminated by a line CAH, drawn from the centre through the other end A; thus BH is the tangent of the arc AB.

24. And the line which terminates the tangent, viz. CH, is called the *secant* of the arc AB.

N^o 137.

25. What an arc wants of a quadrant is called the *complement* of that arc; thus AE, being what the arc AB wants of the quadrant EB, is called the complement of the arc AB.

26. And what an arc wants of a semicircle is called the *supplement* of that arc; thus since AF is what the arc AB wants of the semicircle BAF, it is the supplement of the arc AB.

27. The sine, tangent, &c. of the complement of any arc, is called the *co-sine*, *co-tangent*, &c. of that arc; thus the sine, tangent, &c. of the arc AE, is called the co-sine, co-tangent, &c. of the arc AB.

28. The sine of the supplement of an arc is the same with the sine of the arc itself; for drawing them according to the definitions, there results the self-same line.

29. A right-lined angle is measured by an arc of a circle described upon the angular point as a centre, comprehended between the two legs that form the angle; thus (fig. 14.) the angle ABD is measured by the arc AD of the circle CADE that is described upon the point B as a centre; and the angle is said to be of as many degrees as the arc is; so if the arc AD be 45 degrees, then the angle ABD is said to be an angle of 45 degrees.

Hence the angles are greater or less, according as the arc described about the angular point, and terminated by the two legs, contain a greater or a less number of degrees.

30. When one line falls perpendicularly on another, as AB on CD, fig. 15. then the angles are right (by the 10th def.); and describing a circle on the centre B, since the angles ABC ABD are equal, their measures must be so too. *i. e.* the arcs AC AD must be equal; but the whole CAD is a semicircle, since CD, a line passing through the centre B, is a diameter; therefore each of the parts AC AD is a quadrant, *i. e.* 90 degrees; so the measure of a right angle is always 90 degrees.

31. If one line AB fall any way upon another, CD, then the sum of the two angles ABC ABD is always equal to the sum of two right angles; fig. 16. For on the point B, describing the circle CAD, it is plain, that CAD is a semicircle (by the 14th); but CAD is equal to CA and AD the measure of the two angles; therefore the sum of the two angles is equal to a semicircle, that is, to two right angles, (by the last).

Cor. 1. From whence it is plain, that all the angles which can be made from a point in any line, towards one side of the line, are equal to two right angles.

2. And that all the angles which can be made about a point, are equal to four right ones.

32. If one line AC cross another BD in the point E, then the opposite angles are equal, viz. BEA to CED, and BEC equal to AED; fig. 17. For upon the point E, as a centre, describing the circle ABCD, it is plain ABC is a semicircle, as also BCD (by the 14th); therefore the arc ABC is equal to the arc BCE; and from both taking the common arc BC, there will remain AB equal to CD, *i. e.* the angle BEA equal to the angle CED (by art. 29.) After the same manner we may prove, that the angle BEC is equal to the angle AED.

33. Lines which are equally distant from one another, are called *parallel lines*; as AB, CD, fig. 18.

34. If

34. If a line GH cross two parallels AB, CD, (fig. 19.) then the external opposite angles are equal, viz. GEB equal to CFH, and AEG equal to HFD. For since AB and CD are parallel to one another, they may be considered as one broad line, and GH crossing it; then the vertical or opposite angles GEB CFH are equal (by art. 32.), as also AEG and HFD by the same.

35. If a line GH cross two parallels AB, CD, then the alternate angles, viz. AEF and EFD, or CFE and FEB, are equal; that is, the angle AEF is equal to the angle EFD, and the angle CFE is equal to the angle FEB, for GEB is equal to AEF (by art. 32.), and CFH is equal to EFD (by the same); but GEB is equal to CFH (by the last); therefore AEF is equal to EFD. The same way we may prove FEB equal to EFC.

36. If a line GH cross two parallel lines AB, CD, then the external angle GEB is equal to the internal opposite one EFD, or GEA equal to CFE. For the angle AEF is equal to the angle EFD (by the last); but AEF is equal to GEB (by art. 32.), therefore GEB is equal to EFD. The same way we may prove AEG equal to CFE.

37. If a line GH cross two parallel lines AB, CD, then the sum of the two internal angles, viz. BEF and DFE, or AEF and CFE, are equal to two right angles; for since the angle GEB is equal to the angle EFD (by art. 36.), to both add the angle FEB, then GEB and BEF are equal to BEF and DFE; but GEB and BEF are equal to two right angles (by art. 31.), therefore BEF and DFE are also equal to two right angles. The same way we may prove that AEF and CFE are equal to two right angles.

38. A figure is any part of space bounded by lines or a line. If the bounding lines be straight, it is called a *rectilinear figure*, as fig. 20. if they be curved, it is called a *curvilinear figure*, as fig. 21. and fig. 22.; if they be partly curve lines and partly straight, it is called a *mixt figure*, as fig. 23.

39. The most simple rectilinear figure is that which is bounded by three right lines, and is called a *triangle*, as fig. 24.

40. Triangles are divided into different kinds, both with respect to their sides and angles: with respect to their sides, they are commonly divided into three kinds, viz.

41. A triangle having all its three sides equal to one another, is called an *equilateral triangle*, as fig. 25.

42. A triangle having two of its sides equal to one another, and the third side not equal to either of them, is called an *Isosceles triangle*, as fig. 26.

43. A triangle having none of its sides equal to one another, is called a *scalene triangle*, as fig. 27.

44. Triangles, with respect to their angles, are divided into three different kinds, viz.

45. A triangle having one of its angles right, is called a *right-angled triangle*, as fig. 28.

46. A triangle having one of its angles obtuse, or greater than a right angle, is called an *obtuse-angled triangle*, as fig. 29.

47. Lastly, a triangle having all its angles acute, is called an *acute-angled triangle*, as fig. 30.

48. In all right-angled triangles, the sides comprehend-

ending the right angle are called the *legs*, and the side opposite to the right angle is called the *hypotenuse*. Thus in the right-angled triangle ABC, fig. 31. (the right angle being at B), the two sides AB and BC, which comprehended the right angle ABC, are the legs of the triangle; and the side AC, which is opposite to the right angle ABC, is the hypotenuse of the right-angled triangle ABC.

49. Both obtuse and acute angled triangles are in general called *oblique-angled triangles*; in all which any side is called the *base*, and the other two the *sides*.

50. The perpendicular height of any triangle is a line drawn from the vertex to the base perpendicularly; thus if the triangle ABC (fig. 32.) be proposed, and BC be made its base, then A will be the vertex, viz. the angle opposite to the base; and if from A you draw the line AD perpendicular to BC, then the line AD is the height of the triangle ABC standing on BC as its base.

Hence all triangles standing between the same parallels have the same height, since all the perpendiculars are equal by the nature of parallels.

51. A figure bounded by four sides is called a *quadrilateral* or *quadrangular figure*, as ABDC, fig. 33.

52. Quadrilateral figures, whose opposite sides are parallel, are called *parallelograms*. Thus in the quadrilateral figure ABDC, if the side AC be parallel to the side BD which is opposite to it, and AB be parallel to CD, then the figure ABDC is called a *parallelogram*.

53. A parallelogram having all its sides equal and angles right, is called a *square*, as fig. 34.

54. That which hath only the opposite sides equal and its angles right, is called a *rectangle*, as fig. 35.

55. That which hath equal sides, but oblique angles, is called a *rhombus*, as fig. 36. and is just an inclined square.

56. That which hath only the opposite sides equal and the angles oblique, is called a *rhomboides*, as fig. 37. and may be conceived as an inclined rectangle.

57. When none of the sides are parallel to another, then the quadrilateral figure is called a *trapezium*.

58. Every other right-lined figure, that has more sides than four, is in general called a *polygon*. And figures are called by particular names according to the number of their sides, viz. one of five sides is called a *pentagon*, of six a *hexagon*, of seven a *heptagon*, and so on. When the sides forming the polygon are equal to one another, the figure is called a *regular figure* or *polygon*.

59. In any triangle ABC (fig. 38.) one of its legs, as BC, being produced towards D, the external angle ACD is equal to both the internal opposite ones taken together, viz. to ABC and BAC. In order to prove this, through C, draw CE parallel to AB; then since CE is parallel to AB, and the lines AC and BD cross them, the angle ECD is equal to ABC (by art. 36.) and the angle ACE equal to CAB (by art. 35.); therefore the angles ECD and ECA are equal to the angles ABC and CAB; but the angles ECD and ECA are together equal to the angle ACD; therefore the angle ACD is equal to both the angles ABC and CAB taken together.

Cor. Hence it may be proved, that if two lines AB

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and CD (fig. 39.) be crossed by a third line EF, and the alternate angles AEF and EFD be equal, the lines AB and CD will be parallel; for if they are not parallel, they must meet one another on one side of the line EF (suppose at G), and so form the triangle EFG, one of whose sides GE being produced at A, the exterior angle AEF must (by this article) be equal to the sum of the two angles EFG and EGF; but, by supposition, it is equal to the angles EFG alone; therefore the angle AEF must be equal to the sum of the two angles EFG and EGF, and at the same time equal to the angle EFG alone, which is absurd; so the lines AB and CD cannot meet, and therefore must be parallel.

60. In any triangle ABC, all the three angles taken together are equal to two right angles. To prove this, you must produce BC, one of its legs, to any distance, suppose to D; then by the last proposition, the external angle, ACD, is equal to the sum of the two internal opposite ones CAB and ABC; to both add the angle ACB, then the sum of the angles ACD and ACB will be equal to the sum of the angles CAB and CBA and ACB. But the sum of the angles ACD and ACB is equal to two right ones (by art. 32.), therefore the sum of the three angles CAB and CBA and ACB, is equal to two right angles; that is, the sum of the three angles of any triangle ACB is equal to two right angles.

Cor. 1. Hence in any triangle given, if one of its angles be known, the sum of the other two is also known: for since (by the last) the sum of all the three is equal to two right angles, or a semicircle, it is plain, that taking any one of them from a semicircle or 180 degrees, the remainder will be the sum of the other two. Thus (in the former triangle ABC) if the angle ABC be 40 degrees, by taking 40 from 180 we have 140 degrees; which is the sum of the two angles BAC, ACB: the converse of this is also plain, viz. the sum of any two angles of a triangle being given, the other angle is also known by taking that sum from 180 degrees.

2. In any right-angled triangle, the two acute angles must just make up a right one between them; consequently, any one of the oblique angles being given, we may find the other by subtracting the given one from 90 degrees, which is the sum of both.

61. If in any two triangles, ABC (fig. 40.) DEF (fig. 41.) two legs of the one, viz. AB and AC, be equal to two legs of the other, viz. to DE and DF, each to each respectively, i. e. AB to DE and AC to DF; and if the angles included between the equal legs be equal, viz. the angle BAC equal to the angle EDF; then the remaining leg of the one shall be equal to the remaining leg of the other, viz. BC to EF; and the angles opposite to equal legs shall be equal, viz. ABC equal to DEF (being opposite to the equal legs AC and DF), also ACB equal to DFE (which are opposite to the equal legs AB and DE). For if the triangle ABC be supposed to be lifted up and put upon the triangle DEF, and the point A on the point D; it is plain, since BA and DE are of equal length, the point E will fall upon the point B; and since the angles BAC EDF are equal, the line AC will fall upon the line DF; and they being of equal length, the point C will fall upon the point F; and so the line

BC will exactly agree with the line EF, and the triangle ABC will in all respects be exactly equal to the triangle DEF; and the angle ABC will be equal to the angle DEF, also the angle ACB will be equal to the angle DFE.

Cor. 1. After the same manner it may be proved, that if in any two triangles ABC, DEF (see the preceding figure), two angles ABC and ACB of the one, be equal to two angles DEF and DFE of the other, each to each respectively, viz. the angle ABC to the angle DEF, and the angle ACB equal to the angle DFE, and the sides included between these angles be also equal, viz. BC equal to EF, then the remaining angles, and the sides opposite to the equal angles, will also be equal each to each respectively; viz. the angle BAC equal to the angle EDF, the side AB equal to DE, and AC equal to DF: for if the triangle ABC be supposed to be lifted up and laid upon the triangle DEF, the point B being put upon the point E, and the line BC upon the line EF, since BC and EF are of equal lengths, the point C will fall upon the point F, and since the angle ACB is equal to the angle DFE, the line CA will fall upon the line FD, and by the same way of reasoning the line BA will fall upon the line ED; and therefore the point of intersection of the two lines BA and CA, viz. A, will fall upon the point of intersection of the two lines ED and FD, viz. D, and consequently BA will be equal to ED, and AC equal to DF, and the angle BAC equal to the angle EDF.

Cor. 2. It follows likewise from this article, that if any triangle ABC (fig. 42.) has two of its sides AB and AC equal to one another, the angles opposite to these sides will also be equal, viz. the angles ABC equal to the angle ACB. For suppose the line AD bisecting the angle BAC, or dividing it into two equal angles BAD and CAD, and meeting BC in D, then the line AD will divide the whole triangle BAC into two triangles ABD and DAC; in which BA and AD two sides of the one, are equal to CA and AD two sides of the other, each to each respectively, and the included angles BAD and DAC are by supposition equal; therefore (by this article) the angle ABC must be equal to the angle ACB.

62. Any angle, as BAD (fig. 43.) at the circumference of a circle BADE, is but half the angle BCD at the centre standing on the same arch BED. To demonstrate this, draw through A and the centre C the right line ACE, then the angle ECD is equal to both the angles DAC and ADC (by art. 59.); but since AC and CD are equal (being two radii of the same circle), the angles subtended by them must be equal, also (by art. 62. cor. 2.), i. e. the angle CAD equal to the angle CDA; therefore the sum of them is double any one of them, i. e. DAC and ADC is double of CAD, and therefore ECD is also double of DAC: the same way it may be proved, that ECB is double of CAB; and therefore the angle BCD is double of the angle BAD, or BAD the half of BCD, which was to be proved.

Cor. 1. Hence an angle at the circumference is measured by half the arc it subtends; for the angle at the centre (standing on the same arc) is measured by the whole arc (by art. 29.); but since the angle at the centre is double that at the circumference, it is plain the angle

angle at the circumference must be measured by only half the arc it stands upon.

Cor. 2. Hence all angles, ACB, ADB, AEB, &c. (fig. 44.) at the circumference of a circle, standing on the same chord AB, are equal to one another; for by the last corollary they are all measured by the same arc, viz. half the AB which each of them subtends.

Cor. 3. Hence an angle in a segment greater than a semicircle is less than a right angle: thus, if ADB be a segment greater than a semicircle (see the last figure), then the arc AB, on which it stands, must be less than a semicircle, and the half of it less than a quadrant or a right angle; but the angle ADB in the segment is measured by the half of AB, therefore it is less than a right angle.

Cor. 4. An angle in a semicircle is a right angle. For since ABD (fig. 46.) is a semicircle, the arc AED must also be a semicircle: but the angle ABD is measured by half the arc AED, that is, by half a semicircle or quadrant; therefore the angle ABD is a right one.

Cor. 5. Hence an angle in a segment less than a semicircle, as ABD (fig. 45.), is greater than a right angle: for since the arc ABD is less than a semicircle, the arc AED must be greater than a semicircle, and so it is half greater than a quadrant, i. e. than the measure of a right angle; therefore the angle ABD, which is measured by half the arc AED, is greater than a right angle.

63. If from the centre C of the circle ABE (fig. 47.) there be let fall the perpendicular CD on the chord AB, then that perpendicular will bisect the chord AB in the point D. To demonstrate this, draw from the centre to the extremities of the chord the two lines CA, CB; then, since the lines CA and CB are equal, the angles CAB, CBA, which they subtend, must be equal also (by art. 62. cor. 2.), but the perpendicular CD divides the triangle ACB into two right-angled triangles ACD and CDB, in which the sum of the angles ACD and CAD in the one is equal to the sum of the angles DCB and CDB in the other, each being equal to a right angle (by cor. 2. of art. 61.) but CAD is equal to CBD, therefore ACD is equal to BCD. So in the two triangles ACD and BCD, the two legs AC and CD in the one, are equal to the two legs BC and CD in the other, each to each respectively, and the included angles ACD and BCD are equal; therefore the remaining legs AD and BD are equal (by art. 61.), and consequently AB bisected in D.

64. If from the centre C of a circle ABE, there be drawn a perpendicular CD on the chord AB, and produced till it meet the circle in F, then the line CF bisects the arch AB in the point F; for (see the foregoing figure) joining the points A and F, F and B by the straight lines AF, FB, then in the triangles ADF, BDF, AD is equal to DB (by art. 63.), and DF common to both; therefore AD and DF, two legs of the triangle ADF, are equal to BD and DF, two legs of the triangle BDF, and the included angles ADF BDF are equal, being both right; therefore (by art. 61.) the remaining legs AF and FB are equal; but in the same circle equal lines are chords of equal arches, therefore the arches AF and FB are equal. So the whole arch AFB is bisected in the point F by the line CF.

Cor. 1. From art. 63. it follows, that any line bisecting a chord at right angles is a diameter; for since (by art. 63.) a line drawn from the centre perpendicular to a chord, bisects that chord at right angles; therefore, conversely, a line bisecting a chord at right angles, must pass through the centre, and consequently be a diameter.

Cor. 2. From the two last articles it follows, that the sine of any arc is the half of the chord of twice the arc; for (see the foregoing scheme) AD is the sine of the arc AF, by the definition of a sine, and AF is half the arc AFB, and AD half the chord AB (by art. 63.); therefore the corollary is plain.

65. In any triangle, the half of each side is the sine of the opposite angle; for if a circle be supposed to be drawn through the three angular points A, B, and D of the triangle ABD, fig. 48. then the angle DAB is measured by half the arch BKD (by cor. 1. of art. 62.), but the half of BD, viz. BE, is the sine of half the arch BKD, viz. the sine of BK (by cor. 2. of the last), which is the measure of the angle BAD; therefore the half of BD is the sine of the angle BAD: the same way, it may be proved, that the half of AD is the sine of the angle ABD, and the half of AB is the sine of the angle ADB.

66. The sine, tangent, &c. of any arch is called also the *sine, tangent, &c.* of the angle whose measure the arc is: thus, because the arc GD (fig. 49.) is the measure of the angle GCD; and since GH is the sine, DE the tangent, HD the versed sine, CE the secant, also GK the co-sine, BF the co-tangent, and CF the co-secant, &c. of the arch GD; then GH is called the *sine, DE the tangent, &c.* of the angle GCD, whose measure is the arch GD.

67. If two equal and parallel lines, AB and CD (fig. 50.) be joined by two others, AC and BD; then these shall also be equal and parallel. To demonstrate this, join the two opposite angles A and D with the line AD; then it is plain this line AD divides the quadrilateral, ACDB, into two triangles, viz. ABD, ACD, in which AB a leg of the one, is equal to DC a leg of the other, by supposition, and AD is common to both triangles; and since AB is parallel to CD, the angle BAD will be equal to the angle ADC (by art. 36.); therefore in the two triangles BA and AD, and the angle BAD, is equal to CD and DA, and the angle ADC; that is, two legs and the included angle in the one is equal to two legs and the included angle in the other; therefore (by art. 61.) BD is equal to AC, and since the angle DAC is equal to the angle ADB, therefore the lines BD AC are parallel (by cor. art. 59.)

Cor. 1. Hence it is plain, that the quadrilateral ABDC is a parallelogram, since the opposite sides are parallel.

Cor. 2. In any parallelogram the line joining the opposite angles (called the *diagonal*) as AD, divides the figure into two equal parts, since it has been proved that the triangles ABD ACD are equal to one another.

Cor. 3. It follows also, that a triangle ACD on the same base CD, and between the same parallels with a parallelogram ABDC, is the half of that parallelogram.

Cor. 4. Hence it is plain, that the opposite sides of a paral-

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parallelogram are equal; for it has been proved, that $ABDC$ being a parallelogram, AB will be equal to CD , and AC equal to BD .

68. All parallelograms on the same or equal bases, and between the same parallels, are equal to one another; that is, if BD and GH (fig. 51.) be equal, and the lines BH and AF be parallel, then the parallelograms $ABDC$, $BDFE$, and $EFHG$, are equal to one another. For AC is equal to EF , each being equal to BD (by *cor.* 4. of 67.) To both add CE , then AE will be equal to CF . So in the two triangles ABE CDF , AB a leg of the one, is equal to CD a leg in the other; and AE is equal to CF , and the angle BAE is equal to the angle DCF (by *art.* 36.); therefore the two triangles ABE CDF are equal (by *art.* 61.); and taking the triangle CKE from both, the figure $ABKC$ will be equal to the figure $KDFE$; to both which add the little triangle KBD , then the parallelogram $ABDC$ will be equal to the parallelogram $BDFE$. The same way it may be proved, that the parallelogram $EFHG$ is equal to the parallelogram $EFDB$; so the three parallelograms $ABDC$, $BDFE$, and $EFHG$, will be equal to one another.

Cor. Hence it is plain, that triangles on the same base, and between the same parallels, are equal; since they are the half of the parallelograms on the same base and between the same parallels (by *cor.* 3. of last *art.*)

69. In any right-angled triangle, ABC , (fig. 52.) the square of the hypotenuse BC , viz. $BCMH$, is equal to the sum of the squares made on the two sides AB and AC , viz. to $ABDE$ and $ACGF$. To demonstrate this, through the point A draw AKL perpendicular to the hypotenuse BC , join AH , AM , DC , and BG ; then it is plain that DB is equal to BA (by *art.* 53.), also BH is equal to BC (by the same); so in the two triangles DBC ABH , the two legs DB and BC in the one are equal to the two legs AB and BH in the other; and the included angles DBC and ABH are also equal; (for DBA is equal to CBH , being both right; to each add ABC , then it is plain that DBC is equal to ABH) therefore the triangles DBC ABH are equal (by *art.* 61.), but the triangle DBC is half of the square $ADBE$ (by *cor.* 3. of 67.), and the triangle ABH is half the parallelogram $BKLH$ (by the same), therefore half the square $ADBE$ is equal to half the parallelogram $BKLH$. Consequently the square $ADBE$ is equal to the parallelogram $BKLH$. The same way it may be proved, that the square $ACGF$ is equal to the parallelogram $KCML$. So the sum of the squares $ADBE$ and $ACGF$ is equal to the sum of the parallelograms $BKLH$ and $KCML$, but the sum of these parallelograms is equal to the square $BCMH$; therefore the sum of the squares on AB and AC is equal to the square on BC .

Cor. 1. Hence in a right-angled triangle, the hypotenuse and one of the legs being given, we may easily find the other, by taking the square of the given leg from the square of the hypotenuse, and the square root of the remainder will be the leg required.

Cor. 2. Hence the legs in a right-angled triangle being given, we may find the hypotenuse, by taking the sum of the squares of the given legs, and extracting the square root of that sum.

70. If upon the line AB (fig. 53.) there be drawn

a semicircle ADB , whose centre is C , and on the point C there be raised a perpendicular to the line AB , viz. CD ; then it is plain the arc DB is a quadrant, or contains 90 degrees; suppose the arc DB to be divided into 9 equal arcs, each of which will contain 10 degrees, then on the point B raising BE perpendicular to the line AB , it will be a tangent to the circle in quadrant, viz. B 10, B 20, B 30, B 40, &c. you draw the sine, tangent, &c. (as in the scheme) we shall have the sine, tangent, &c. to every 10 degrees in the quadrant: and the same way we may have the sine, tangent, &c. to every single degree in the quadrant, by dividing it into 90 equal parts beginning from B , and drawing the sine, tangent, &c. to all the arcs beginning at the same point B . By this method they draw the lines of sines, tangents, &c. of a certain circle on the scale; for after drawing them on the circle, they take the length of them, and set them off in the lines drawn for that purpose. The same way, by supposing the radius of any number of equal parts, (suppose 1000, or 10,000, &c.) it is plain the sine, tangent, &c. of every arc must consist of some number of these equal parts, and by computing them in parts of the radius, we have tables of sines, tangents, &c. to every arc in the quadrant, called *natural sines, tangents, &c.* and the logarithms of these give us tables of logarithmic sines, tangents, &c. See LOGARITHMS.

71. In any triangle, ABC , (fig. 1.) if one of its sides, as AC , be bisected in E (and consequently AC double of AE), and through E be drawn ED , parallel to BC , and meeting AB in D , then BC will be double of ED , and AB double of AD . Through D draw DF , parallel to AC , meeting BC in F : for since, by construction, DF is parallel to AC , and DE parallel to BC ; therefore (by *art.* 36.) the angle BFD will be equal to the angle BCA , and (by the same article) the angle BCA will be equal to the angle DEA , consequently the angle BFD will be equal to the angle DEA ; also (by *art.* 36.) the angle BDF will be equal to the angle DAE : and since DF is parallel to EC , and DE parallel to FC , the quadrilateral $DFCE$ will be a parallelogram; and therefore (by *art.* 59. *cor.* 4.) DF will be equal to EC , which, by construction, is equal to AE ; so in the two triangles BDF DAE , the two angles BFD and BDF in the one, are equal to the two angles DEA and DAE in the other, each to each respectively; and the included side DF is equal to the included side AE ; therefore (by *art.* 61. *cor.* 1.) AD will be equal to DB , and consequently AB double of AD ; also (by the same) DE will be equal to BF ; but DE is also (by *art.* 67. *cor.* 4.) equal to FC ; therefore BF and ED together, or BC , will be double of DE .

After the same manner it may be proved, that if in the triangle AKG , (fig. 2.) AE be taken equal to a third part of AK , and through E be drawn ED , parallel to KG , and meeting AG in D ; then ED will be equal to a third part of GK , and AD equal to a third part of AG .

Likewise if in any triangle ABC , (fig. 3.) upon the side AB , be taken AE , equal to one fourth, one-fifth, one-sixth, &c. of AB , and through E be drawn ED parallel to BC and meeting AC in D ; then D will be one-fourth, one-fifth, one-sixth, &c. of BC , and AD the like part of AC ; and, in general, if in any triangle

angle ABC, there be assumed a point E on one of its sides AB, and through that point be drawn a line ED, parallel to one of its sides BC, and meeting the other side AC in D; then whatever part AE is of AB, the same part will ED be of BC, and AD of AC.

Cor. Hence it follows, that if in any triangle ABC, there be drawn ED, parallel to one of its sides BC, and meeting the other two in the points E and D, then $AE : AB :: ED : BC :: AD : AC$; that is, AE is to AB, as ED is to BC, and that as AD to AC.

72. If any two triangles ABC, fig. 4. a b c, fig. 5. are similar, or have all the angles of the one equal to all the angles of the other, each to each respectively; that is, the angle CAB equal to the angle c a b, and the angle ABC equal to the angle a b c, and the angle ACB equal to the angle a c b; then the legs opposite to the equal angles are proportioned, viz. $AB : a b :: AC : a c ::$ and $AB : a b :: BC : b c ::$ and $AC : a c :: BC : b c$. On AB of the largest triangle set off AE equal to a b, and through E draw ED parallel to BC, meeting AC in D; then since DE and BC are parallel, and AB crossing them, the angle AED will (by art. 36.) be equal to the angle ABC, which (by supposition) is equal to the angle a b c, also the angle DAE is (by supposition) equal to the angle c a b; so in the two triangles AED, a b c, the two angles DAE AED of the one, are equal to two angles c a b a b c of the other, each to each respectively, and the included side AE is (by construction) equal to the included side a b; therefore, (by art. 61. cor. 1.) AD is equal to a c, and DE equal to b c; but since, in the triangle ABC, there is drawn DE parallel to BC one of its sides, and meeting the two other sides in the points D and E, therefore (by cor. art. 71.) $AB : AE :: AC : AD$, and $AB : AE :: BC : DE$, and $AC : AD :: BC : DE$; and in the three last proportions, instead of the lines AE, DE, and AD, putting in their equals a b, b c, and a c, we shall have $AB : a b :: AC : a c$, and $AB : a b :: BC : b c$, and lastly, $AC : a c :: BC : b c$.

73. The chord, sine, tangent, &c. of any arc in one circle, is to the chord, sine, tangent, &c. of the same arc in another, as the radius of the one is to the radius of the other, fig. 6. 6. Let ABD a b d be two circles, BD b d two arcs of these circles, equal to one another, or consisting of the same number of degrees; FD f d the tangents, BD b d the chords, BE b e the sines, &c. of these two arcs BD b d, and CD c d the radii of the circles; then say, $CD : c d :: FD : f d$, and $CD : c d :: BD : b d$, and $CD : c d :: BE : b e$, &c. For since the arcs BD b d are equal, the angles BCD b c d will be equal; and FD f d, being tangents to the points D and d, the angles CDF c d f will be equal, being each a right angle (art. 22.) so in the two triangles CDF c d f, the two angles FCD CDF of the one, being equal to the two angles f c d c d f of the other, each to each, the remaining angle CFD will be equal to the remaining angle c f d (by art. 60.); therefore the triangles CDF c d f are similar, and consequently (by art. 73.) $CD : c d :: FD : f d$. In the same manner it may be demonstrated, that $CD : c d :: BD : b d$, and $CD : c d :: BE : b e$, &c.

74. Let ABD (fig. 7.) be a quadrant of a circle described by the radius CD; BD any arc of it, and BA its complement; BG or CF the sine, CG or BF the co-

sine; DE the tangent, and CE the secant of that arc BD. Then since the triangles CDE CBG are similar or equiangular, it will be (by art. 72.) $DE : EC :: GB : BC$, i. e. the tangent of any arc, is to the secant of the same, as the sine of it is to the radius. Also since $DE : EC :: GB : BC$; therefore, by inverting that proportion, we have $EC : DE :: BC : GB$, i. e. the secant is to the tangent, as the radius is to the sine of any arc.

Again, since the triangles CDE CGB are similar, therefore (by art. 72.) it will be $CD : CE :: CG : CB$, i. e. as the radius is to the secant of any arc, so is the co-sine of that arc to the radius. And by inverting the proportion we have this, viz. as the secant of any arc is to the radius, so is the radius to the co-sine of that arc.

75. In all circles the chord of 60 is always equal in length to the radius. Thus in the circle AEBD, (fig. 8.) if the arc AEB be an arc of 60 degrees, then drawing the chord AB, I say AB shall be equal to the radius CB or AC; for in the triangle ACB, the angle ACB is 60 degrees, being measured by the arc AEB; therefore the sum of the other two angles is 120 degrees, (by cor. 1. of 60); but since AC and CB are equal, the two angles CAB, CBA will also be equal; consequently each of them half their sum 120, viz. 60 degrees; therefore, all the three angles are equal to one another, consequently all the legs, therefore AB is equal to CB.

Cor. Hence the radius from which the lines on any scale are formed, is the chord of 60 on the line of chords.

Geometrical Problems.

PROB. 1. From a point C (fig. 9.) in a given line AB to raise a perpendicular to that line.

Rule. From the point C take the equal distances CB, CA on each side of it. Then stretch the compasses to any greater distance than CB or CA, and with one foot of them in B, sweep the arc EF with the other; again, with the same opening, and one foot in A, sweep the arc GH with the other, and these two arcs will intersect one another in the point D; then join the given points C and D with the line CD, and that shall be the perpendicular required.

2. To divide a given right line AB (fig. 10.) into two equal parts; that is, to bisect them.

Rule. Take any distance with your compasses that you are sure is greater than half the given line; then setting one foot of them in B, with the other sweep the arc DFG; and with the same distance, and one foot in A, with the other sweep the arc CED; these two arcs will intersect one another in the points D, which joined by the right line CD will bisect AB in G.

3. From a given point D, (fig. 11.) to let fall a perpendicular on a given line AB.

Rule. Set one foot of the compasses in the point D, and extend the other to any greater distance than the least distance between the given point and the line, and with that extent sweep the arc AEB, cutting the line in the two points A and B, then (by the last prob.) bisect the line AB in the point C; lastly, join C and D, and that line CD is the perpendicular required.

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4. (Fig. 12.) Upon the end B of a given right line BA, to raise a perpendicular.

Rule. Take any extent in your compasses, and with one foot in B fix the other in any point C without the given line; then with one point of the compasses in C, describe with the other the circle EBD, and through E and C draw the diameter ECD meeting the circle in D; join D and B, and the right line DB is that required; for EBD is a right angle (by cor. 4. of 63.)

5. (Fig. 13.) To draw one line parallel to another given line AB, that shall be distant from one another by any given distance D.

Rule. Extend your compasses to the given distance D; then setting one foot of them in any point of the given line (suppose A,) with the other sweep the arc FCG; again, at the same extent, and one foot in any other point of the given line B, sweep the arc HDK, and draw the line CD touching them, and that will be parallel to the given line AB, and distant from it by the line D as was required.

6. (Fig. 14.) To divide a given line AB into any number of equal parts, suppose 7.

Rule. From the point A draw any line AD, making an angle with the line AB, then through the point B, draw a line EC parallel to AD; and from A, with any small opening of the compasses, set off a number of equal parts (on the line AD) less by one than the proposed number (here 6.); then from B set off the same number of the same parts (on the line BC); lastly, join 1 and 6, 2 and 5, 3 and 4, 4 and 3, 5 and 2, 6 and 1, and these lines will cut the given line as required.

7. (Fig. 15.) To quarter a given circle, or to divide it into four equal parts.

Rule. Through the centre C of the given circle, draw a diameter AB, then upon the point C raise a perpendicular DCE to the line AB; and these two diameters AB and DE shall quarter the circle.

8. (Fig. 16.) Through three given points A, B, and D, to draw a circle. *Note.* The three points must not lie in the same straight line.

Rule. Join A and B, also B and D, with the straight lines AB BD; then (by prob. 2.) bisect AB with the line EC, also BD with the line FC, which two lines will cut one another in some point C; that is the centre of the circle required: then fixing one point of our compasses in D, and stretching the other to A, describe the circle ABDG, which will pass through the three points given. The reason of this is plain from cor. 1. of art. 64.

9. (Fig. 17.) From the point A of the given line AB, to draw another line (suppose AC) that shall make with AB an angle of any number of degrees, suppose 45.

Rule. Let the given line AB be produced, then take off your scale the length of the chord of 60 degrees, which is equal to the radius of the circle the scale was made for (by art. 75.); and setting the foot in A, with the other sweep off the arc BC; then with your compasses take from your scale the chord of 45 degrees, and set off that distance from B to C. Lastly, join A and C, and the line AC is that required. For the angle CAB, which is measured by the arc BC, is an angle of 45 degrees, as was required.

10. An angle BAC (fig. 18.) being given, to find how many degrees it contains.

Rule. With your compasses take the length of your chord of 60 from your scale. Then, setting one foot of them in A, with the other sweep the arc BC, which is the arc comprehended between the two legs AB, AC produced if needful. Lastly, take with your compasses the distance BC, and applying it to your line of chords on the scale, you will find how many degrees the arc BC contains, and consequently the degrees of the angle BAC which was required.

11. Three lines x , y , and z being given. (fig. 19.) to form a triangle of them; but any two of these lines taken together must always be greater than the third.

Rule. Make any one of them, as x , the base; then with your compasses take another of them, as z , and setting one foot in one end of the line x , as B, with the other sweep the arc DE; and taking with your compasses the length of the other y , set one foot of them in A, the other end of the line x , and with the other sweep the arc FG, which will cut the other in C; lastly, join CA and CB, and the triangle CAB is that required.

12. To make a triangle, having one of its legs of any number of equal parts (suppose 160,) and one of the angles at that leg 50 degrees, and the other 44 degrees.

Rule. Draw an indefinite line ED, (fig. 20.) then take off the line of equal parts with your compasses, 160 of them, and set them on the indefinite line, as BC; then (by prob. 9.) draw BA, making the angle ABC of 50 degrees, and (by the same) draw from C the line AC, making the angle ABC of 44 degrees; which two lines will meet one another in A, and the triangle ABC is that required. See TRIGONOMETRY.

13. Upon a given line AB (fig. 21.) to make a square.

Rule. Upon the extremity A of the given line AB, raise a perpendicular AC (by prob. 4.); then take AC equal to AB, and with that extent, setting one foot of the compasses in C, sweep with the other foot the arc GH; then with the same extent, and one foot in B, with the other sweep the arc EF, which will meet the former in some point D; lastly, join C and D, D and B, and the figure ABDC will be the square required.

14. On a given line AB (fig. 22.) to draw a rhomb that shall have one of its angles equal to any number of degrees, suppose 60 degrees.

Rule. From the point A of the given line AB, draw the line AC, making the angle CAB of 60 degrees, (by prob. 9.) then take AC equal to AB, and with that extent, fixing one foot of the compasses in B, with the other describe the arc GH; and at the same extent, fixing one foot of the compasses in C, with the other describe the arc EF cutting the former in D; lastly, join CD and DB, and the figure ACDB is that required.

16. Given two lines x and z , of these two to make a rectangle.

Rule. Draw a line, as AB, (fig. 23. 23.) equal in length to one of the given lines x ; and on the extremity A of that line raise a perpendicular AC, on which

Lines and Angles. which take AC equal to the other line z ; then take with your compasses the length of the line AB, and at that extent, fixing one foot of them in C, with the other sweep the arc EF; and also taking with your compasses the extent of the line AC, fix one foot of them in B, and with the other sweep the arc GH, which will meet the former in D; lastly, join CD and BD, and the figure ABDC will be that required.

16. Two lines x and z being given, of these to form a rhomboides that shall have one of its angles any number of degrees, suppose 50.

Lines and Angles. *Rule.* Draw a line AB (fig. 24. 24.) equal in length to one of the lines, as x ; then draw the line AC, making with the former the angle BAC equal to the proposed, suppose 50 degrees, and on that line take AC equal to the given line z ; then with your compasses take the length of AB, and fixing one foot in C, sweep the arc EF; also taking the length of AC, and setting one foot in B, with the other sweep the arc GH, which will cut the former in D; then join CD and DB, so the figure ACDB will be that required.

PART. II. THE APPLICATION OF THE FOREGOING PRINCIPLES TO THE MENSURATION OF SURFACES, SOLIDS, &c.

CHAP. I. Of the Mensuration of Lines and Angles.

A Line or length to be measured, whether it be distance, height, or depth, is measured by a line less than it. With us the least measure of length is an inch: not that we measure no line less than it, but because we do not use the name of any measure below that of an inch; expressing lesser measures by the fractions of an inch: and in this treatise we use decimal fractions as the easiest. Twelve inches make a foot; three feet and an inch make the Scots ell; six ells make a fall; forty falls make a furlong; eight furlongs make a mile: so that the Scots mile is 1184 paces, accounting every pace to be five feet. These things are according to the statutes of Scotland; notwithstanding which, the glaziers use a foot of only eight inches; and other artists for the most part use an English foot, on account of the several scales marked on the English foot-measure for their use. But the English foot is somewhat less than the Scots; so that 185 of these make 186 of those.

Lines, to the extremities and any intermediate point of which you have easy access, are measured by applying to them the common measure a number of times. But lines, to which you cannot have such access, are measured by methods taken from geometry; the chief whereof we shall here endeavour to explain. The first is by the help of the geometrical square.

"As for the English measures, the yard is 3 feet, or 36 inches. A pole is sixteen feet and a half, or five yards and a half. The chain, commonly called *Gunter's chain*, is four poles, or 22 yards, that is, 66 feet. An English statute-mile is fourscore chains, or 1760 yards, that is, 5280 feet.

"The chain (which is now much in use, because it is very convenient for surveying) is divided into 100 links, each of which is $\frac{7}{100}$ of an inch: whence it is easy to reduce any number of those links to feet, or any number of feet to links.

"A chain that may have the same advantages in surveying Scotland, as *Gunter's chain* has in England, ought to be in length 74 feet, or 24 Scots ells, if no regard is had to the difference of the Scots and English foot above mentioned. But if regard is had to that difference, the Scots chain ought to consist of $74\frac{1}{2}$ English feet, or 74 feet 4 inches and $\frac{1}{4}$ ths of an inch. This chain being divided into 100 links, each of those links is 8 inches and $\frac{23}{100}$ of an inch. In the following table, the most noted measures are expressed in English inches and decimals of an inch."

	English Inch.	Dec.
The English foot, is	12	000
The Paris foot,	12	788
The Rhindland foot measured by Mr Picart,	12	362
The Scots foot,	12	065
The Amsterdam foot, by Snellius and Picart,	11	172
The Dantzick foot, by Hevelius,	11	297
The Danish foot, by Mr Picart,	12	465
The Swedish foot, by the same,	11	692
The Brussels foot, by the same,	10	828
The Lyons foot, by Mr Auzout,	13	458
The Bononian foot, by Mr Cassini,	14	938
The Milan foot, by Mr Auzout,	15	631
The Roman palm used by merchants, according to the same,	9	791
The Roman palm used by architects,	8	779
The palm of Naples, according to Mr Auzout,	10	314
The English yard,	36	000
The English ell,	45	000
The Scots ell,	37	200
The Paris aune used by mercers, according to Mr Picart,	46	786
The Paris aune used by drapers, according to the same,	46	680
The Lyons aune, by Mr Auzout,	46	570
The Geneva aune,	44	760
The Amsterdam ell,	26	800
The Danish ell, by Mr Picart,	24	930
The Swedish ell,	23	380
The Norway ell,	24	510
The Brabant or Antwerp ell,	27	170
The Brussels ell,	27	260
The Bruges ell,	27	550
The brace of Bononia, according to Auzout,	25	200
The brace used by architects in Rome,	30	730
The brace used in Rome by merchants,	34	270
The Florence brace used by merchants, according to Picart,	22	910
The Florence geographical brace,	21	570
The vara of Seville,	33	127
The vara of Madrid,	39	166
The vara of Portugal,	44	031
The cavedo of Portugal,	27	354
The ancient Roman foot,	11	632
The Persian arish, according to Mr Græves,	38	364
The shorter pike of Constantinople, according to the same,	25	576
Another pike of Constantinople, according to Messrs Mallet and De la Porte,	27	920

PRO-

P R O P O S I T I O N I.

PROB. *To describe the structure of the geometrical square.*—The geometrical square is made of any solid matter, as brass or wood, or of any four plain rulers joined together at right angles (as in fig. 1.), where A is the centre, from which hangs a thread with a small weight at the end, so as to be directed always to the centre. Each of the sides BE and DE is divided into an hundred equal parts, or (if the sides be long enough to admit of it) into a thousand parts; C and F at two sights, fixed on the side AD. There is moreover an index GH, which, when there is occasion, is joined to the centre A, in such manner as that it can move round, and remain in any given situation. On this index are two sights perpendicular to the right line going from the centre of the instrument: these are K and L. The side DE of the instrument is called the upright side; E the reclining side.

P R O P O S I T I O N II.

FIG. 2. *To measure an accessible height AB by the help of a geometrical square, its distance being known.*—Let BR be an horizontal plane, on which there stands perpendicularly any line AB: let BD, the given distance of the observer from the height, be 96 feet: let the height of the observer's eye be supposed 6 feet; and let the instrument, held by a steady hand, or rather leaning on a support, be directed towards the summit A, so that one eye (the other being shut) may see it clearly through the sights; the perpendicular or plumb-line meanwhile hanging free, and touching the surface of the instrument; let now the perpendicular be supposed to cut off on the right side KN 80 equal parts. It is clear that LKN, ACK, are similar triangles; for the angles LKN, ACK are right angles, and therefore equal; moreover, LN and AC are parallel, as being both perpendicular to the horizon; consequently (by art. 60. cor. 1. Part I), the angles KLN, KAC, are equal; wherefore (by art. 60. cor. 2. of Part I), the angles LNK and CAK are likewise equal: so that in the triangles NKL, KAC, (by art. 72. of Part I.) as NK:KL::KC (i. e. BD):CA; that is, as 80 to 100, so is 96 feet to CA. Therefore, by the rule of three, CA will be found to be 120 feet; and CB, which is 6 feet, being added, the whole height is 126 feet.

But if the distance of the observer from the height, as BE, be such, that when the instrument is directed as formerly toward the summit A, the perpendicular falls on the angle P, opposite to H, the centre of the instrument, and BE or CG be given of 120 feet; CA will also be 120 feet. For in the triangles HGP, ACG, equiangular, as in the preceding case, as DG:GH::GC:CA. But PG is equal to GH; therefore GC is likewise equal to CA: that is, CA will be 120 feet, and the whole height 126 feet as before.

Let the distance BF be 300 feet, and the perpendicular or plumb-line cut off 40 equal parts from the reclining side: Now, in this case, the angles QAC, QZI, are equal, and the angles QZI, ZIS, are equal; therefore the angle ZIS is equal to the angle QAC. But the angles ZSI, QCA are equal, being right angles; therefore, in the equiangular triangles ACQ, SZI, it will be, as ZS:SI::CQ:CA; that is, as 100 to 40, so is 300 to CA. Wherefore, by the rule of three, CA will be found to be of 102 feet. And, by adding
N^o 137.

the height of the observer, the whole BA will be 126 feet. Note, that the height is greater than the distance, when the perpendicular cuts the right side, and less if it cut the reclined side; and that the height and distance are equal, if the perpendicular fall on the opposite angle.

S C H O L I U M.

If the height of a tower to be measured as above, end in a point (as in fig. 3.), the distance of the observer opposite to it, is not CD, but is to be accounted from the perpendicular to the point A; that is, to CD must be added the half of the thickness of the tower, viz. BD: which must likewise be understood in the following propositions, when the case is similar.

P R O P O S I T I O N III.

FIG. 4. *From the height of a tower AB given, to find a distance on the horizontal plane BC, by the geometrical square.*—Let the instrument be so placed, as that the mark C in the opposite plane may be seen through the sights; and let it be observed how many parts are cut off by the perpendicular. Now, by what hath been already demonstrated, the triangles AEF, ABC, are similar; therefore, it will be as EF to AE, so AB (composed of the height of the tower BG, and of the height of the centre of the instrument A, above the tower BG) to the distance BC. Wherefore, if, by the rule of three, you say, as EF to AE, so is AB to BC, it will be the distance sought.

P R O P O S I T I O N IV.

FIG. 5. *To measure any distance at land or sea, by the geometrical square.*—In this operation, the index is to be applied to the instrument, as was shown in the description; and, by the help of a support, the instrument is to be placed horizontally at the point A; then let it be turned till the remote point F, whose distance is to be measured, be seen through the fixed sights; and bringing the index to be parallel with the other side of the instrument, observe by the sights upon it any accessible mark B, at a sensible distance: then carrying the instrument to the point B, let the immoveable sights be directed to the first station A, and the sights of the index to the point F. If the index cut the right side of the square, as in K, in the two triangles BRK, and BAF, which are equiangular, it will be as BR to RK, so BA (the distance of the stations to be measured with a chain) to AF; and the distance AF sought will be found by the rule of three. But if the index cut the reclined side of the square in any point L, where the distance of a more remote point is sought: in the triangles BLS, BAG, the side LS shall be to SB, as BA to AG, the distance sought; which accordingly will be found by the rule of three.

P R O P O S I T I O N V.

FIG. 6. *To measure an accessible height by means of a plain mirror.*—Let AB be the height to be measured; let the mirror be placed at C, in the horizontal plane BD, at a known distance BC; let the observer go back to D, till he see the image of the summit in the mirror, at a certain point of it, which he must diligently mark; and let DE be the height of the observer's eye. The triangles ABC and EDC are equiangular; for the angles at D and B are right angles; and ACB, ECD, are equal, being the angles
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of incidence and reflexion of the ray AC, as is demonstrated in optics; wherefore the remaining angles at A and E are also equal; therefore it will be as CD to DE, so CB to BA; that is, as the distance of the observer from the point of the mirror in the right line betwixt the observer and the height, is to the height of the observer's eye, so is the distance of the tower from that point of the mirror to the height of the tower sought; which therefore will be found by the rule of three.

Note 1. The observation will be more exact, if, at the point D, a staff be placed in the ground perpendicularly, over the top of which the observer may see a point of the glass exactly in a line betwixt him and the tower.

Note 2. In place of a mirror may be used the surface of water contained in a vessel, which naturally becomes parallel to the horizon.

PROPOSITION VI.

FIG. 7. To measure an accessible height AB by means of two staffs.—Let there be placed perpendicularly in the ground a longer staff DE, likewise a shorter one FG, so as the observer may see A, the top of the height to be measured, over the ends DF of the two staffs; let FH and DC, parallel to the horizon, meet DE and AB in H and C; then the triangles FHD, DCA, shall be equiangular; for the angles at C and H are right ones; likewise the angle A is equal to the angle FDH; wherefore the remaining angles DFH, and ADC, are also equal: wherefore, as FH, the distance of the staffs, to HD, the excess of the longer staff above the shorter; so is DC, the distance of the longer staff from the tower, to CA, the excess of the height of the tower above the longer staff. And thence CA will be found by the rule of three.

To which if the length DE be added, you will have the whole height of the tower BA.

SCHOLIUM.

FIG. 8. Many other methods may be occasionally contrived for measuring an accessible height. For example, from the given length of the shadow BD, to find out the height AB, thus: Let there be erected a staff CE perpendicularly, producing the shadow EF: The triangles ABD, CEF, are equiangular; for the angles at B and E are right; and the angles ADB and CFE are equal, each being equal to the angle of the sun's elevation above the horizon: Therefore, as EF, the shadow of the staff, to EC, the staff itself; so BD, the shadow of the tower, to BA, the height of the tower. Though the plane on which the shadow of the tower falls be not parallel to the horizon, if the staff be erected in the same plane, the rule will be the same.

PROPOSITION VII.

To measure an inaccessible height by means of two staffs.—Hitherto we have supposed the height to be accessible, or that we can come at the lower end of it; now if, because of some impediment, we cannot get to a tower, or if the point whose height is to be found out be the summit of a hill, so that the perpendicular be hid within the hill; if, for want of better instruments, such an inaccessible height is to be measured by means of two staffs, let the first observation be made with the staffs DE and FG, (as in prop. 6.); then the observer is to go off in a direct line from the height

and first station, till he come to the second station; where (fig. 11.) he is to place the longer staff perpendicularly at RN, and the shorter staff at KO, so that the summit A may be seen along their tops; that is, so that the points KNA may be in the same right line. Through the point N, let there be drawn the right line NP parallel to FA: Wherefore in the triangles KNP, KAF, the angles KNP, KAF are equal, also the angle AKF is common to both; consequently the remaining angle KPN is equal to the remaining angle KFA. And therefore, $PN : FA :: KP : KF$. But the triangles PNL, FAS are similar; therefore, $PN : FA :: NL : SA$. Therefore (by the 11. 5. Eucl.) $KP : KF :: NL : SA$. Thence, alternately, it will be, as KP (the excess of the greater distance of the short staff from the long one above its lesser distance from it) to NL, the excess of the longer staff above the shorter; so KF, the distance of the two stations of the shorter staff to SA, the excess of the height sought above the height of the shorter staff. Wherefore SA will be found by the rule of three. To which let the height of the shorter staff be added, and the sum will give the whole inaccessible height BA.

Note 1. In the same manner may an inaccessible height be found by a geometrical square, or by a plain speculum. But we shall leave the rules to be found out by the student, for his own exercise.

Note 2. That by the height of the staff we understand its height above the ground in which it is fixed.

Note 3. Hence depends the method of using other instruments invented by geometricians; for example, of the geometrical cross: and if all things be justly weighed, a like rule will serve for it as here. But we incline to touch only upon what is most material.

PROPOSITION VIII.

FIG. 9. To measure the distance AB, to one of whose extremities we have access, by the help of four staffs.—Let there be a staff fixed at the point A; then going back at some sensible distance in the same right line, let another be fixed in C, so as that both the points A and B be covered and hid by the staff C: likewise going off in a perpendicular from the right line CB, at the point A (the method of doing which shall be shown in the following scholium), let there be placed another staff at H; and in the right line CKG (perpendicular to the same CB, at the point B), and at the point of it K, such that the points K, H, and B may be in the same right line, let there be fixed a fourth staff. Let there be drawn, or let there be supposed to be drawn, a right line GH parallel to CA. The triangles KGH, HAB, will be equiangular; for the angles HAB, KGH are right angles. Also the angles ABH, KHG are equal; wherefore, as KG (the excess of CK above AH) to GH, or to CA, the distance betwixt the first and second staff; so is AH, the distance betwixt the first and third staff, to AB the distance sought.

SCHOLIUM.

Fig. 10. To draw on a plane a right line AE perpendicular to CH, from a given point A; take the right lines AB, AD, on each side equal; and in the points B and D, let there be fixed stakes, to which let there be tied two equal ropes BE, DE, or one having a mark in the middle, and holding in your hand their extremities joined (or the mark in the middle, if it be but one), draw out the ropes on the ground; and

then where the two ropes meet, or at the mark, when by it the rope is fully stretched, let there be placed a third stake at E; the right line AE will be perpendicular to CH in the point A (prob. 1. of Part I.). In a manner not unlike to this, may any problems, that are resolved by the square and compasses, be done by ropes and a cord turned round as a radius.

PROPOSITION IX.

FIG. 12. *To measure the distance AB, one of whose extremities is accessible.*—From the point A, let the right line AC of a known length be made perpendicular to AB (by the preceding scholium); likewise draw the right line CD perpendicular to CB, meeting the right line AB in D: then as $DA : AC :: AC : AB$. Wherefore, when DA and AC are given, AB will be found by the rule of three.

SCHOLIUM.

All the preceding operations depend on the equality of some angles of triangles, and on the similarity of the triangles arising from that equality. And on the same principles depend innumerable other operations which a geometrician will find out of himself, as is very obvious. However, some of these operations require such exactness in the work, and without it are so liable to errors, that, *ceteris paribus*, the following operations, which are performed by a trigonometrical calculation, are to be preferred; yet could we not omit those above, being most easy in practice, and most clear and evident to those who have only the first elements of geometry. But if you are provided with instruments, the following operations are more to be relied upon. We do not insist on the easiest cases to those who are skilled in plain trigonometry, which is indeed necessary to any one who would apply himself to practice. See TRIGONOMETRY.

PROPOSITION X.

FIG. 13. *To describe the construction and use of the geometrical quadrant.*—The geometrical quadrant is the fourth part of a circle divided into 90 degrees, to which two sights are adapted, with a perpendicular or plumb-line hanging from the centre. The general use of it is for investigating angles in a vertical plane, comprehended under right lines going from the centre of the instrument, one of which is horizontal, and the other is directed to some visible point. This instrument is made of any solid matter, as wood, copper, &c.

PROPOSITION XI.

FIG. 14. *To describe and make use of the graphometer.*—The graphometer is a semicircle made of any hard matter, of wood, for example, or brass, divided into 180 degrees; so fixed on a fulcrum, by means of a brass ball and socket, that it easily turns about, and retains any situation; two sights are fixed on its diameter. At the centre there is commonly a magnetic needle in a box. There is likewise a moveable ruler, which turns round the centre, and retains any situation given it. The use of it is to observe any angle, whose vertex is at the centre of the instrument in any plane (though it is most commonly horizontal, or nearly so), and to find how many degrees it contains.

PROPOSITION XII.

FIG. 15. and 16. *To describe the manner in which angles are measured by a quadrant or graphometer.*—Let

there be an angle in a vertical plane, comprehended between a line parallel to the horizon HK, and the right line RA, coming from any remarkable point of a tower or hill, or from the sun, moon, or a star. Suppose that this angle RAH is to be measured: by the quadrant: let the instrument be placed in the vertical plane, so as that the centre A may be in the angular point; and let the sights be directed towards the object at R (by the help of the ray coming from it, if it be the sun or moon, or by the help of the visual ray, if it is any thing else), the degrees and minutes in the arc BC, cut off by the perpendicular, will measure the angle RAH required. For, from the make of the quadrant, BAD is a right angle; therefore BAR is likewise right, being equal to it. But, because HK is horizontal, and AC perpendicular, HAC will be a right angle; and therefore equal also to BAR. From those angles subtract the part HAB that is common to both; and there will remain the angle BAC equal to the angle RAH. But the arc BC is the measure of the angle BAC; consequently, it is likewise the measure of the angle RAH.

Note, That the remaining arc on the quadrant DC is the measure of the angle RAZ, comprehended between the foresaid right line RA and AZ which points to the zenith.

Let it now be required to measure the angle ACB (fig. 16.) in any plane, comprehended between the right lines AC and BC, drawn from two points A and B, to the place of station C. Let the graphometer be placed at C, supported by its fulcrum (as was shown above); and let the immoveable sights on the side of the instrument DE be directed towards the point A; and likewise (while the instrument remains immoveable) let the sights of the ruler FG (which is moveable about the centre C) be directed to the point B. It is evident that the moveable ruler cuts off an arc DH, which is the measure of the angle ACB sought. Moreover, by the same method, the inclination of CE, or of FG, may be observed with the meridian line, which is pointed out by the magnetic needle inclosed in the box, and is moveable about the centre of the instrument, and the measure of this inclination or angle found in degrees.

PROPOSITION XIII.

FIG. 17. *To measure an accessible height by the geometrical quadrant.*—By the 12th prop. of this Part, let the angle C be found by means of the quadrant. Then in the triangle ABC, right-angled at B (BC being supposed the horizontal distance of the observer from the tower), having the angle at C, and the side BC, the required height BA will be found by the 3d case of plane trigonometry. See TRIGONOMETRY.

PROPOSITION XIV.

FIG. 18. *To measure an inaccessible height by the geometrical quadrant.*—Let the angle ACB be observed with the quadrant (by the 12th prop. of this Part); then let the observer go from C to the second station D, in the right line BCD (provided BCD be a horizontal plane); and after measuring this distance CD; take the angle ADC likewise with the quadrant. Then, in the triangle ACD, there is given the angle ADC, with the angle ACD; because ACB was given before: therefore (by art. 59. of Part I.) the remaining angle CAD is given likewise. But the side CD is likewise

and likewise given, being the distance of the station C and D; therefore (by the first case of oblique-angled triangles in trigonometry) the side AC will be found. Wherefore, in the right-angled triangle ABC, all the angles and the hypotenuse AC are given; consequently, by the fourth case of trigonometry, the height sought AB will be found; as also (if you please) the distance of the station C, from AB the perpendicular within the hill or inaccessible height.

PROPOSITION XV.

FIG. 19. *From the top of a given height, to measure the distance BC.*—Let the angle BAC be observed by the 12th prop. of this; wherefore in the triangle ABC, right-angled at B, there is given by observation the angle at A; whence (by the 59th art. of Part. I.) there will also be given the angle BCA: moreover the side AB (being the height of the tower) is supposed to be given. Wherefore, by the 3d case of trigonometry, BC, the distance sought, will be found.

PROPOSITION XVI.

FIG. 20. *To measure the distance of two places A and B, of which one is accessible, by the graphometer.*—Let there be erected at two points A and C, sufficiently distant, two visible signs; then (by the 12th prop. of this Part) let the two angles BAC, BCA, be taken by the graphometer. Let the distance of the stations A and C be measured with a chain. Then the third angle B being known, and the side AC being likewise known; therefore, by the first case of trigonometry, the distance required, AB, will be found.

PROPOSITION XVII.

FIG. 21. *To measure by the graphometer the distance of two places, neither of which is accessible.*—Let two stations C and D be chosen, from each of which the places may be seen whose distance is sought; let the angles ACD, ACB, BCD, and likewise the angles BDC, BDA, CDA, be measured by the graphometer; let the distance of the stations C and D be measured by a chain, or (if it be necessary) by the preceding practice. Now, in the triangle ACD, there are given two angles ACD and ADC; therefore, the third CAD is likewise given; moreover, the side CD is given; therefore, by the first case of trigonometry, the side AD will be found. After the same manner, in the triangle BCD, from all the angles and one side CD given, the side BD is found. Wherefore, in the triangle ADB, from the given sides DA and DB, and the angle ADB contained by them, the side AB (the distance sought) is found by the 4th case of trigonometry of oblique-angled triangles.

PROPOSITION XVIII.

FIG. 22. *It is required by the graphometer and quadrant to measure an accessible height AB, placed so on a steep, that one can neither go near it in an horizontal plane, nor recede from it, as we supposed in the solution of the 14th prop.*—Let there be chosen any situation, as C, and another D; where let some mark be erected: let the angles ACD and ADC be found by the graphometer; then the third angle DAC will be known. Let the side CD, the distance of the stations, be measured with a chain, and thence (by trigon.) the side AC will be found. Again, in the triangle ACB, right-angled at B, having found by the quadrant the angle ACB, the other angle CAB is known likewise: but the side AC in the triangle ADC is already known;

therefore the height required AB will be found by the 4th case of right-angled triangles. If the height of the tower is wanted, the angle BCF will be found by the quadrant: which being taken from the angle ACB already known, the angle ACF will remain: but the angle FAC was known before; therefore the remaining angle AFC will be known. But the side AC was also known before; therefore, in the triangle AFC, all the angles and one of the sides AC being known, AF, the height of the tower above the hill, will be found by trigonometry.

SCHOLIUM.

It were easy to add many other methods of measuring heights and distances; but if what is above be understood, it will be easy (especially for one that is versed in the elements) to contrive methods for this purpose, according to the occasion: so that there is no need of adding any more of this sort. We shall subjoin here a method by which the diameter of the earth may be found out.

PROPOSITION XIX.

FIG. 1. *To find the diameter of the earth from one observation.*—Let there be chosen a high hill AB, near the sea-shore, and let the observer on the top of it, with an exact quadrant divided into minutes and seconds by transverse divisions, and fitted with a telescope in place of the common sights, measure the angle ABE contained under the right line AB, which goes to the centre, and the right line BE drawn to the sea, a tangent to the globe at E; let there be drawn from A perpendicular to BD, the line AF meeting BE in F. Now in the right-angled triangle BAF all the angles are given, also the side AB, the height of the hill; which is to be found by some of the foregoing methods as exactly as possible; and (by trigonometry) the sides BF and AF are found. But by cor. 36th 3. Eucl. AF is equal to FE; therefore BE will be known. Moreover, by 36th 3. Eucl. the rectangle under BA and BD is equal to the square of BE. And thence by 17th 6. Eucl. as AB : BE :: BE : BD. Therefore, since AB and BE are already given, BD will be found by 11th 6. Eucl. or by the rule of three; and subtracting BA, there will remain AD the diameter of the earth sought.

SCHOLIUM.

Many other methods might be proposed for measuring the diameter of the earth. The most exact is that proposed by Mr Picart of the academy of sciences at Paris.

“According to Mr Picart, a degree of the meridian at the latitude of $49^{\circ} 21'$ was 57,060 French toises, each of which contains six feet of the same measure: from which it follows, that if the earth be an exact sphere, the circumference of a great circle of it will be 123,249,600 Paris feet, and the semidiameter of the earth 19,615,800 feet: but the French mathematicians, who of late have examined Mr Picart's operations, assure us, that the degree in that latitude is 57,183 toises. They measured a degree in Lapland, in the latitude of $66^{\circ} 20'$, and found it of 57,438 toises. By comparing these degrees, as well as by the observations on pendulums, and the theory of gravity, it appears that the earth is an oblate spheroid; and (supposing those degrees to be accurately measured) the axis or diameter that passes through the poles will be to the

Lines and
Angles.

diameter of the equator as 177 to 178; or the earth will be 22 miles higher at the equator than at the poles. A degree has likewise been measured at the equator, and found to be considerably less than at the latitude of Paris; which confirms the oblate figure of the earth. But an account of this last mensuration has not been published as yet. If the earth was of an uniform density from the surface to the centre, then, according to the theory of gravity, the meridian would be an exact ellipsis, and the axis would be to the diameter of the equator as 230 to 231; and the difference of the semidiameter of the equator and femiaxis about 17 miles."

In what follows, a figure is often to be laid down on paper, like to another figure given; and because this likeness consists in the equality of their angles, and in the sides having the same proportion to each other (by the definitions of the 6th of Eucl.) we are now to show what methods practical geometricians use for making on paper an angle equal to a given angle, and how they constitute the sides in the same proportion. For this purpose they make use of a protractor (or, when it is wanting, a line of chords), and of a line of equal parts.

PROPOSITION XX.

FIG. 2. 3. 4. 5. and 6. *To describe the construction and use of the protractor, of the line of chords, and of the line of equal parts.* The protractor is a small semicircle of brass, or such solid matter. The semicircumference is divided into 180 degrees. The use of it is, to draw angles on any plane, as on paper, or to examine the extent of angles already laid down. For this last purpose, let the small point in the centre of the protractor be placed above the angular point, and let the side AB coincide with one of the sides that contain the angle proposed; the number of degrees cut off by the other side, computing on the protractor from B, will show the quantity of the angle that is to be measured.

But if an angle is to be made of a given quantity on a given line, and at a given point of that line, let AB coincide with the given line, and let the centre A of the instrument be applied to that point. Then let there be a mark made at the given number of degrees; and a right line drawn from that mark to the given point, will constitute an angle with the given right line of the quantity required; as is manifest.

This is the most natural and easy method, either for examining the extent of an angle on paper, or for describing on paper an angle of a given quantity.

But when there is scarcity of instruments, or because a line of chords is more easily carried about (being described on a ruler on which there are many other lines besides), practical geometricians frequently make use of it. It is made thus: let the quadrant of a circle be divided into 90 degrees (as in fig. 4.) The line AB is the chord of 90 degrees; the chord of every arc of the quadrant is transferred to this line AB, which is always marked with the number of degrees in the corresponding arc.

Note, That the chord of 60 degrees is equal to the radius, by corol. 15. 4th Eucl. If now a given angle EDF is to be measured by the line of chords from the centre D, with the distance DG (the chord of 60 degrees), describe the arc GF; and let the points G and F be marked where this arc intersects the sides

of the angle. Then if the distance GF, applied on the line of chords from A to B, gives (for example) 25 degrees, this shall be the measure of the angle proposed.

When an obtuse angle is to be measured with this line, let its complement to a semicircle be measured, and thence it will be known. It were easy to transfer to the diameter of a circle the chords of all arches to the extent of a semicircle; but such are rarely found marked upon rules.

But now, if an angle of a given quantity, suppose of 50 degrees, is to be made at a given point M of the right line KL (fig. 6.) From the centre M, and the distance MN, equal to the chord of 60 degrees, describe the arc QN. Take off an arc NR, whose chord is equal to that of 50 degrees on the line of chords; join the points M and R; and it is plain that MR shall contain an angle of 50 degrees with the line KL proposed.

But sometimes we cannot produce the sides till they be of the length of a chord of 60 degrees on our scale; in which case it is fit to work by a circle of proportions (that is a sector), by which an arc may be made of a given number of degrees to any radius.

The quantities of angles are likewise determined by other lines usually marked upon rules, as the lines of sines, tangents, and secants; but as these methods are not so easy or so proper in this place, we omit them.

To delineate figures similar or like to others given, besides the equality of the angles, the same proportion is to be preserved among the sides of the figure that is to be delineated, as is among the sides of the figures given. For which purpose, on the rules used by artists, there is a line divided into equal parts, more or less in number, and greater or less in quantity according to the pleasure of the maker.

A foot is divided into inches; and an inch, by means of transverse lines, into 100 equal parts; so that with this scale, any number of inches below 12, with any part of an inch, can be taken by the compasses, providing such part be greater than the 100th part of an inch. And this exactness is very necessary in delineating the plans of houses, and in other cases.

PROPOSITION XXI.

FIG. 7. *To lay down on paper, by the protractor or line of chords, and line of equal parts, a right-lined figure like to one given, providing the angles and sides of the figure given be known by observation or mensuration.* For example, suppose that it is known that in a quadrangular figure, one side is of 235 feet, that the angle contained by it and the second side is of 84° , the second side of 288 feet, the angle contained by it and the third side of 72° , and that the third side is 294 feet. These things being given, a figure is to be drawn on paper like to this quadrangular figure. On your paper at a proper point A, let a right line be drawn, upon which take 235 equal parts, as AB. The part representing a foot is taken greater or less, according as you would have your figure greater or less. In the adjoining figure, the 100th part of an inch is taken for a foot. And accordingly an inch divided into 100 parts, and annexed to the figure, is called a scale of 100 feet. Let there be made at the point B (by the preceding proposition) an angle ABC of 85° , and let BC be taken of 288 parts like to the former. Then let the angle BCD be made of 72° , and the side CD

of

of 294 equal parts. Then let the side AD be drawn; and it will complete the figure like to the given. The measures of the angle A and D can be known by the protractor or line of chords, and the side AD by the line of equal parts; which will exactly answer to the corresponding angles and to the side of the primary figure.

After the very same manner, from the sides and angles given which bound any right-lined figure, a figure like to it may be drawn, and the rest of its sides and angles be known.

COROLLARY.

Hence any trigonometrical problem in right-lined triangles may be resolved by delineating the triangle from what is given concerning it, as in this proposition. The unknown sides are examined by a line of equal parts, and the angles by a protractor or line of chords.

PROPOSITION XXII.

The diameter of a circle being given, to find its circumference nearly.—The periphery of any polygon inscribed in the circle is less than the circumference, and the periphery of any polygon described about a circle is greater than the circumference. Whence Archimedes first discovered that the diameter was in proportion to the circumference, as 7 to 22 nearly; which serves for common use. But the moderns have computed the proportion of the diameter to the circumference to greater exactness. Supposing the diameter 100, the periphery will be more than 314, but less than 315. The diameter is more nearly to the circumference, as 113 to 355. But Ludolphus van Cuelen exceeded the labours of all; for by immense study he found, that supposing the diameter 100,000,000,000,000,000,000,000,000,000,000, the periphery will be less than

314,159,265,358,979,323,846,264,338,327,951,
but greater than

314,159,265,358,979,323,846,264,338,327,950;
whence it will be easy, any part of the circumference being given in degrees and minutes, to assign it in parts of the diameter.

CHAP. II. Of Surveying and Measuring of LAND.

HITHERTO we have treated of the measuring of angles and sides, whence it is abundantly easy to lay down a field, a plane, or an entire country; for to this nothing is requisite but the protraction of triangles, and of other plain figures, after having measured their sides and angles. But as this is esteemed an important part of practical geometry, we shall subjoin here an account of it with all possible brevity; suggesting withal, that a surveyor will improve himself more by one day's practice than by a great deal of reading.

PROPOSITION XXIII.

To explain what surveying is, and what instruments Surveyors use.—First, it is necessary that the surveyor view the field that is to be measured, and investigate its sides and angles, by means of an iron chain (having a particular mark at each foot of length, or at any number of feet, as may be most convenient for reducing lines or surfaces to the received measures), and the graphometer described above. Secondly, It is necessary to delineate the field in *plano*, or to form a map of it; that is, to lay down on paper a figure si-

milar to the field; which is done by the protractor (or line of chords) and the line of equal parts. Thirdly, It is necessary to find out the area of the field so surveyed and represented by a map. Of this last we are to treat below.

The sides and angles of small fields are surveyed by the help of a plain-table: which is generally of an oblong rectangular figure, and supported by a *fulcrum*, so as to turn every way by means of a ball and socket. It has a moveable frame, which furrounds the board, and serves to keep a clean paper put on the board close and right to it. The sides of the frame facing the paper are divided into equal parts every way. The board hath besides a box with a magnetic needle, and moreover a large index with two sights. On the edge of the frame of the board are marked degrees and minutes, so as to supply the room of a graphometer.

PROPOSITION XXIV.

FIG. 8. To delineate a field by the help of a plain-table, from one station whence all its angles may be seen and their distances measured by a chain.—Let the field that is to be laid down be ABCDE. At any convenient place F, let the plain-table be erected; cover it with clean paper, in which let some point near the middle represent the station. Then applying at this place the index with the sights, direct it so as that through the sights some mark may be seen at one of the angles, suppose A; and from the point F, representing the station, draw a faint right line along the side of the index: then, by the help of the chain, let FA the distance of the station from the foresaid angle be measured. Then taking what part you think convenient for a foot or pace from the line of equal parts, set off on the faint line the parts corresponding to the line FA that was measured; and let there be a mark made representing the angle of the field A. Keeping the table immoveable, the same is to be done with the rest of the angles; then right lines joining those marks shall include a figure like to the field, as is evident from 5, 6. Eucl.

COROLLARY.

The same thing is done in like manner by the graphometer: for having observed in each of the triangles, AFB, BFC, CFD, &c. the angle at the station F, and having measured the lines from the station to the angles of the field, let similar triangles be protracted on paper (by the 21. prop. of this); having their common vertex in the point of station. All the lines, excepting those which represent the sides of the field, are to be drawn faint or obscure.

Note 1. When a surveyor wants to lay down a field, let him place distinctly in a register all the observations of the angles, and the measures of the sides, until, at time and place convenient, he draw out the figure on paper.

Note 2. The observations made by the help of the graphometer are to be examined: for all the angles about the point F ought to be equal to four right ones. (by cor. 2. art. 30. of Part I.)

PROPOSITION XXV.

FIG. 9. To lay down a field by means of two stations, from each of which all the angles can be seen, by measuring only the distance of the stations.—Let the instrument be placed at the station F: and having chosen

a point representing it upon the paper which is laid upon the plain table, let the index be applied at this point, so as to be moveable about it. Then let it be directed successively to the several angles of the field: and when any angle is seen through the sights, draw an obscure line along the side of the index. Let the index, with the sights, be directed after the same manner to the station G: on the obscure line drawn along its side, pointing to A, set off from the scale of equal parts a line corresponding to the measured distance of the stations, and this will determine the point G. Then remove the instrument to the station G, and applying the index to the line representing the distance of the stations, place the instrument so that the first station may be seen through the sights. Then the instrument remaining immovable, let the index be applied to the point representing the second station G, and be successively directed by means of its sights to all the angles of the field, drawing (as before) obscure lines: and the intersection of the two obscure lines that were drawn to the same angle from the two stations will always represent that angle on the plan. Care must be taken that those lines be not mistaken for one another. Lines joining those intersections will form a figure on the paper like to the field.

S C H O L I U M.

It will not be difficult to do the same by the graphometer, if you keep a distinct account of your observations of the angles made by the line joining the stations, and the lines drawn from the stations to the respective angles of the field. And this is the most common manner of laying down whole countries. The tops of two mountains are taken for two stations, and their distance is either measured by some of the methods mentioned above, or is taken according to common report. The sights are successively directed towards cities, churches, villages, forts, lakes, turnings of rivers, woods, &c.

Note, The distance of the stations ought to be great enough, with respect to the field that is to be measured; such ought to be chosen as are not in a line with any angle of the field. And care ought to be taken likewise that the angles, for example, FAG, FDG, &c. be neither very acute, nor very obtuse. Such angles are to be avoided as much as possible; and this admonition is found very useful in practice.

P R O P O S I T I O N XXVI.

FIG. 10. *To lay down any field, however irregular its figure may be, by the help of the graphometer.*—Let ABCEDHG be such a field. Let its angles (in going round it) be observed with a graphometer (by the 12. of this) and noted down; let its sides be measured with a chain; and (by what was said on the 21. of this) let a figure like to the given field be protracted on paper. If any mountain is in the circumference, the horizontal line hid under it is to be taken for a side, which may be found by two or three observations according to some of the methods described above; and its place on the map is to be distinguished by a shade, that it may be known a mountain is there.

If not only the circumference of the field is to be laid down on the plan, but also its contents, as villages, gardens, churches, public roads, we must proceed in this manner.

Let there be (for example) a church F, to be laid

down in the plan. Let the angles ABF BAF be observed and protracted on paper in their proper places, the intersection of the two sides BF and AF will give the place of the church on the paper: or, more exactly, the lines BF AF being measured, let circles be described from the centres B and A, with parts from the scale corresponding to the distances BF and AF, and the place of the church will be at their intersection.

Note 1. While the angles observed by the graphometer are taken down, you must be careful to distinguish the external angles, as E and G, that they may be rightly protracted afterwards on paper.

Note 2. Our observations of the angles may be examined by computing if all the internal angles make twice as many right angles, four excepted, as there are sides of the figure; (for this is demonstrated by 32, 1. Eucl.) But in place of any external angle DEC, its complement to a circle is to be taken.

P R O P O S I T I O N XXVII.

FIG. 11. *To lay down a plain field without instruments.*—If a small field is to be measured, and a map of it to be made, and you are not provided with instruments; let it be supposed to be divided into triangles, by right-lines, as in the figure; and after measuring the three sides of any of the triangles, for example of ABC, let its sides be laid down from a convenient scale on paper, (by the 22. of this.) Again, let the other two sides BD CD of the triangle CBD be measured and protracted on the paper by the same scale as before. In the same manner proceed with the rest of the triangles of which the field is composed, and the map of the field will be perfected; for the three sides of a triangle determine the triangle; whence each triangle on the paper is similar to its correspondent triangle in the field, and is similarly situated; consequently the whole figure is like to the whole field.

S C H O L I U M.

If the field be small, and all its angles may be seen from one station, it may be very well laid down by the plain-table, (by the 24. of this.) If the field be larger, and have the requisite conditions, and great exactness is not expected, it likewise may be plotted by means of the plain-table, or by the graphometer (according to the 25. of this); but in fields that are irregular and mountainous, when an exact map is required, we are to make use of the graphometer (as in the 26. of this), but rarely of the plain-table.

Having protracted the bounding lines, the particular parts contained within them may be laid down by the proper operations for this purpose (delivered in the 26th proposition; and the method described in the 27th proposition may be sometimes of service); for we may trust more to the measuring of sides than to the observing of angles. We are not to compute four-sided and many-sided figures till they are resolved into triangles: for the sides do not determine those figures.

In the laying down of cities, or the like, we may make use of any of the methods described above that may be most convenient.

The map being finished, it is transferred on clean paper, by putting the first sketch above it, and marking the angles by the point of a small needle. These points being joined by right lines, and the whole illuminated

minated by colours proper to each part, and the figure of the mariner's compass being added to distinguish the north and south, with a scale on the margin, the map or plan will be finished and neat.

We have thus briefly and plainly treated of surveying, and shown by what instruments it is performed; having avoided those methods which depend on the magnetic needle, not only because its direction may vary in different places of a field (the contrary of this at least doth not appear,) but because the quantity of an angle observed by it cannot be exactly known; for an error of two or three degrees can scarcely be avoided in taking angles by it.

As for the remaining part of surveying, whereby the area of a field already laid down on paper is found in acres, roods, or any other superficial measures; this we leave to the following section, which treats of the mensuration of surfaces.

" Besides the instruments described above, a surveyor ought to be provided with an off-set staff equal in length to 10 links of the chain, and divided into 10 equal parts. He ought likewise to have 10 arrows or small straight sticks near two feet long, shod with iron ferrils. When the chain is first opened, it ought to be examined by the off-set staff. In measuring any line, the leader of the chain is to have the 10 arrows at first setting out. When the chain is stretched in the line, and the near end touches the place from which you measure, the leader sticks one of the 10 arrows in the ground, at the far end of the chain. Then the leader leaving the arrow, proceeds with the chain another length; and the chain being stretched in the line, so that the near end touches the first arrow, the leader sticks down another arrow at his end of the chain. The line is preserved straight, if the arrows be always set so as to be in a right line with the place you measure from, and that to which you are going. In this manner they proceed till the leader have no more arrows. At the eleventh chain, the arrows are to be carried to him again, and he is to stick one of them into the ground, at the end of the chain. And the same is to be done at the 21. 31. 41. &c. chains, if there are so many in a right line to be measured. In this manner you can hardly commit an error in numbering the chains, unless of 10 chains at once.

The off-set staff serves for measuring readily the distances of any things proper to be represented in your plan, from the station-line, while you go along. These distances ought to be entered into your field-book, with the corresponding distances from the last station, and proper remarks, that you may be enabled to plot them justly, and be in no danger of mistaking one for another when you extend your plan. The field-book may be conveniently divided into five columns. In the middle column the angles at the several stations taken by the theodolite are to be entered, with the distances from the stations. The distances taken by the off-set staff, on either side of the station-line, are to be entered into columns on either side of the middle column, according to their position with respect to that line. The names and characters of the objects, with proper remarks, may be entered in columns on either side of these last.

" Because, in the place of the graphometer described by our author, surveyors now make use of the

theodolite, we shall subjoin a description of Mr Sisson's latest improved theodolite from Mr Gardner's practical surveying improved. See a figure of it in Plate CCXVIII.

" In this instrument, the three staffs, by brass ferrils at top screw into bell-metal joints, that are moveable between brass pillars, fixed in a strong brass plate; in which, round the centre, is fixed a socket with a ball moveable in it, and upon which the four screws press, that set the limb horizontal. Next above is another such plate, through which the said screws pass, and on which, round the centre, is fixed a frustrum of a cone of bell-metal, whose axis (being connected with the centre of the bell) is always perpendicular to the limb, by means of a conical brass ferril fitted to it, whereon is fixed the compass-box; and on it the limb, which is a strong bell-metal ring, whereon are moveable three brass indexes, in whose plate are fixed four brass pillars, that, joining at top, hold the centre pin of the bell-metal double sextant, whose double index is fixed on the centre of the same plate: Within the double sextant is fixed the spirit level, and over it the telescope.

" The compass-box is graved with two diamonds for north and south, and with 20 degrees on both sides of each, that the needle may be set to the variation, and its error also known.

" The limb has two *fleurs de luce* against the diamonds in the box, instead of 180 each, and is curiously divided into whole degrees, and numbered to the left hand at every 10 to twice 180, having three indexes distant 120. (with Nonius's divisions on each for the decimals of a degree), that are moved by a pinion fixed below one of them, without moving the limb; and in another is a screw and spring under, to fix it to any part of the limb. It has also divisions numbered, for taking the quarter girt in inches of round timber at the middle height, when standing 10 feet horizontally distant from its centre; which at 20 must be doubled, and at 30 tripled; to which a shorter index is used, having Nonius's divisions for the decimals of an inch; but an abatement must be made for the bark, if not taken off.

" The double sextant is divided on one side from under its centre (when the spirit-tube and telescope are level) to above 60 degrees each way, and numbered at 10, 20, &c. and the double index (through which it is moveable) shows on the same side the degree and decimal of any altitude or depression to that extent by Nonius's divisions: On the other side are divisions numbered, for taking the upright height of timber, &c. in feet, when distant 10 feet; which at 20 must be doubled, and at 30 tripled; and also the quantities for reducing hypotenusal lines to horizontal. It is moveable by a pinion fixed in the double index.

" The telescope is a little shorter than the diameter of the limb, that a fall may not hurt it; yet it will magnify as much, and show a distant object as perfect as most of triple its length. In its focus are very fine cross wires, whose intersection is in the plane of the double sextant; and this was a whole circle, and turned in a lathe to a true plane, and is fixed at right angles to the limb; so that, whenever the limb is set horizontal (which is readily done by making the spi-

Surveying
of Land.

Surveying
of Land.

rit-tube level over two screws, and the like over the other two), the double sextant and telescope are moveable in a vertical plane; and then every angle taken on the limb (though the telescope be never so much elevated or depressed) will be an angle in the plane of the horizon. And this is absolutely necessary in plotting a horizontal plane.

"If the lands to be plotted are hilly, and not in any one plane, the lines measured cannot be truly laid down on paper, without being reduced to one plane, which must be the horizontal, because angles are taken in that plane.—

"In viewing your objects, if they have much altitude or depression, either write down the degree and decimal shown on the double sextant, or the links shown on the back side; which last subtracted from every chain in the station-line, leaves the length in the horizontal plane. But if the degree is taken, the following table will show the quantity.

A Table of the links to be subtracted out of every chain in hypotenusal lines of several degrees altitude, or depression, for reducing them to horizontal.

Degrees.	Links.	Degrees.	Links.	Degrees.	Links.
4,05	$\frac{1}{4}$	14,07	3	23,074	8
5,73	$\frac{1}{2}$	16,26	4	24,495	9
7,02	$\frac{3}{4}$	18,195	5	25,84	10
8,11	1	19,95	6	27,13	11
11,48	2	21,565	7	28,36	12

"Let the first station line really measure 1107 links, and the angle of altitude or depression be $19^{\circ} 95'$; looking in the table you will find against $19^{\circ} 95'$, is 6 links. Now 6 times 11 is 66, which subtracted from 1107, leaves 1041, the true length to be laid down in the plan.

It is useful in surveying, to take the angles, which the bounding lines form, with the magnetic needle, in order to check the angles of the figure, and to plot them conveniently afterwards."

CHAP. III. Of the Surfaces of Bodies.

THE smallest superficial measure with us is a square inch; 144 of which make a square foot. Wrights make use of these in the measuring of deals and planks; but the square foot which the glaziers use in measuring of glass, consists only of 64 square inches. The other measures are, first, the ell square; secondly, the fall, containing 36 square ells; thirdly, the rood, containing 40 falls; fourthly, the acre, containing 4 roods. Slaters, masons, and pavers, use the ell square and the fall; surveyors of land use the square ell, the fall, the rood, and the acre.

The superficial measures of the English are, first, the square foot; secondly, the square yard, containing 9 square feet, for their yard contains only 3 feet; thirdly, the pole, containing $30\frac{1}{2}$ square yards; fourthly, the rood, containing 40 poles; fifthly, the acre, containing 4 roods. And hence it is easy to reduce our superficial measures to the English, or theirs to ours.

"In order to find the content of a field, it is most convenient to measure the lines by the chains described above, p. 671. that of 22 yards for computing the English acres, and that of 24 Scots ells for the acres of Scotland. The chain is divided into 100 links, and

N^o 137.

the square of the chain is 10,000 square links; 10 squares of the chain, or 100,000 square links, give an acre. Therefore, if the area be expressed by square links, divide by 100,000, or cut off five decimal places, and the quotient shall give the area in acres and decimals of an acre. Write the entire acres apart; but multiply the decimals of an acre by 4, and the product shall give the remainder of the area in roods and decimals of a rood. Let the entire roods be noted apart after the acres; then multiply the decimals of a rood by 40, and the product shall give the remainder of the area in falls or poles. Let the entire falls or poles be then writ after the roods, and multiply the decimals of a fall by 36, if the area is required in the measures of Scotland; but multiply the decimals of a pole by $30\frac{1}{2}$, if the area is required in the measures of England, and the product shall give the remainder of the area in square ells in the former case, but in square yards in the latter. If, in the former case, you would reduce the decimals of the square ell to square feet, multiply them by 9.50694; but, in the latter case, the decimals of the English square yard are reduced to square feet, by multiplying them by 9.

"Suppose, for example, that the area appears to contain 12.65842 square links of the chain of 24 ells; and that this area is to be expressed in acres, roods, falls, &c. of the measures of Scotland. Divide the square links by 100,000, and the quotient 12.65842 shows the area to contain 12 acres $\frac{65842}{100000}$ of an acre. Multiply the decimal part by 4, and the product 2.63368 gives the remainder in roods and decimals of a rood. Those decimals of the rood being multiplied by 40, the product gives 25.3472 falls. Multiply the decimals of the fall by 36, and the product gives 12.4992 square ells. The decimals of the square ell multiplied by 9.50994 give 4.7458 square feet. Therefore the area proposed amounts to 12 acres, 2 roods, 25 falls, 12 square ells, and $4\frac{7458}{10000}$ square feet.

"But if the area contains the same number of square links of Gunter's chain, and is to be expressed by English measures, the acres and roods are computed in the same manner as in the former case. The poles are computed as the falls. But the decimals of the pole, viz. $\frac{3472}{10000}$, are to be multiplied by $30\frac{1}{2}$ (or 30.25), and the product gives 10.5028 square yards. The decimals of the square yard, multiplied by 9, give 4.5252 square feet; therefore, in this case, the area is in English measure 12 acres, 2 roods, 25 poles, 10 square yards, and $4\frac{5252}{10000}$ square feet.

"The Scots acre is to the English acre, by statute, as 100,000 to 78,694, if we have regard to the difference betwixt the Scots and English foot above mentioned. But it is customary in some parts of England to have 18.21, &c. feet to a pole, and 160 such poles to an acre; whereas, by the statute, 16 $\frac{1}{2}$ feet make a pole. In such cases the acre is greater in the duplicate ratio of the number of feet to a pole.

"They who measure land in Scotland by an ell of 37 English inches, make the acre less than the true Scots acre by $593\frac{5}{10}$ square English feet, or by about $\frac{1}{37}$ of the acre.

"An husband land contains 6 acres of sock and scythe-land, that is, of land that may be tilled with a plough, and mown with a scythe; 13 acres of arable land

of land make an oxgang or oxengate; four oxengate make a pound-land of old extent (by a decree of the Exchequer, March 11. 1585), and is called *librata terre*. A forty-shilling land of old extent contains 8 oxgang, or 104 acres.

"The arpent, about Paris, contains 32,400 square Paris feet, and is equal to $2\frac{2}{3}$ Scots roods, or $3\frac{1}{3}$ English roods.

"The *æsus quadratus*, according to Varro, Collumella, &c. was a square of 120 Roman feet. The *jugerum* was the double of this. It is to the Scots acre as 10,000 to 20,456, and to the English acre as 10,000 to 16,097. It was divided (like the *ar*) into 12 *uncia*, and the *uncia* into 24 *scrupula*."—This, with the three preceding paragraphs, are taken from an ingenious manuscript, written by Sir Robert Stewart professor of natural philosophy. The greatest part of the table in p. 671. was taken from it likewise.

PROPOSITION XXVIII.

FIG. 12. To find out the area of a rectangular parallelogram ABCD.—Let the side AB, for example, be 5 feet long, and BC (which constitutes with BA a right angle at B) be 17 feet. Let 17 be multiplied by 5, and the product 85 will be the number of square feet in the area of the figure ABCD. But if the parallelogram proposed is not rectangular as BEFC, its base BC multiplied into its perpendicular height AB (not into its side BE) will give its area. This is evident from art. 68. of Part I.

PROPOSITION XXIX.

FIG. 13. To find the area of a given triangle.—Let the triangle BAC be given, whose base BC is supposed 9 feet long: let the perpendicular AD be drawn from the angle A opposite to the base, and let us suppose AD to be 4 feet. Let the half of the perpendicular be multiplied into the base, or the half of the base into the perpendicular, or take the half of the product of the whole base into the perpendicular, the product gives 18 square feet for the area of the given triangle.

But if only the sides are given, the perpendicular is found either by protracting the triangle, or by 12th and 13th 2. Eucl. or by trigonometry. But how the area of a triangle may be found from the given sides only, shall be shown in the 31st proposition.

PROPOSITION XXX.

FIG. 14. To find the area of any rectilinear figure.—If the figure be irregular, let it be resolved into triangles; and drawing perpendiculars to the bases in each of them, let the area of each triangle be found by the preceding proposition, and the sum of these areas will give the area of the figure.

SCHOLIUM 1.

In measuring boards, planks, and glass, their sides are to be measured by a foot-rule divided into 100 equal parts; and after multiplying the sides, the decimal fractions are easily reduced to lesser denominations. The mensuration of these is easy, when they are rectangular parallelograms.

SCHOLIUM 2.

If a field is to be measured, let it first be plotted on paper, by some of the methods above described, and let the figure so laid down be divided into triangles, as was shown in the preceding proposition.

The base of any triangle, or the perpendicular upon

the base, or the distance of any two points of the field, is measured by applying it to the scale according to which the map is drawn.

SCHOLIUM 3.

But if the field given be not in an horizontal plane, but uneven and mountainous, the scale gives the horizontal line between any two points, but not their distance measured on the uneven surface of the field. And indeed it would appear, that the horizontal plane is to be accounted the area of an uneven and hilly country. For if such ground is laid out for building on, or for planting with trees, or bearing corn, since these stand perpendicular to the horizon, it is plain, that a mountainous country cannot be considered as of greater extent for those uses than the horizontal plane; nay, perhaps, for nourishing of plants, the horizontal plane may be preferable.

If, however, the area of a figure, as it lies regularly on the surface of the earth, is to be measured, this may be easily done by resolving it into triangles as it lies. The sum of their areas will be the area sought; which exceeds the area of the horizontal figure more or less, according as the field is more or less uneven.

PROPOSITION XXXI.

FIG. 13. The sides of a triangle being given, to find the area, without finding the perpendicular.—Let all the sides of the triangle be collected into one sum; from the half of which let the sides be separately subtracted, that three differences may be found betwixt the fore-said half sum and each side; then let these three differences and the half sum be multiplied into one another, and the square root of the product will give the area of the triangle. For example, let the sides be 10, 17, 21; the half of their sum is 24; the three differences betwixt this half sum and the three sides, are 14, 7, and 3. The first being multiplied by the second, and their product by the third, we have 294 for the product of the differences; which multiplied by the fore-said half sum 24, gives 7056; the square root of which 84 is the area of the triangle. The demonstration of this, for the sake of brevity, we omit. It is to be found in several treatises, particularly in Clavius's Practical Geometry.

PROPOSITION XXXII.

FIG. 15. The area of the ordinate figure ABEFGH is equal to the product of the half circumference of the polygon, multiplied into the perpendicular drawn from the centre of the circumscribed circle to the side of the polygon.—For the ordinate figure can be resolved into as many equal triangles as there are sides of the figure; and since each triangle is equal to the product of half the base into the perpendicular, it is evident that the sum of all the triangles together, that is the polygon, is equal to the product of half the sum of the bases (that is the half of the circumference of the polygon) into the common perpendicular height of the triangles drawn from the centre C to one of the sides; for example, to AB.

PROPOSITION XXXIII.

FIG. 16. The area of a circle is found by multiplying the half of the periphery into the radius, or the half of the radius into the periphery.—For a circle is not different from an ordinate or regular polygon of an infinite number of sides, and the common height of the triangles in-

Surfaces of
Bodies.

to which the polygon or circle may be supposed to be divided is the radius of the circle.

Were it worth while, it were easy to demonstrate accurately this proposition, by means of the inscribed and circumscribed figures, as is done in the 5th prop. of the treatise of Archimedes concerning the dimensions of the circle.

C O R O L L A R Y.

Hence also it appears, that the area of the sector ABCD is produced by multiplying the half of the arc into the radius, and likewise that the area of the segment of the circle ADC is found by subtracting from the area of the sector the area of the triangle ABC.

P R O P O S I T I O N XXXIV.

FIG. 17. *The circle is to the square of the diameter as 11 to 14 nearly.*—For if the diameter AB be supposed to be 7, the circumference AHBK will be almost 22 (by the 22d prop. of this Part), and the area of the square DC will be 49; and, by the preceding prop. the area of the circle will be $28\frac{1}{2}$: therefore the square DC will be to the inscribed circle as 49 to $38\frac{1}{2}$, or as 98 to 77, that is, as 14 to 11. *Q. E. D.*

If greater exactness is required, you may proceed to any degree of accuracy: for the square DC is to the inscribed circle, as 1 to $1 - \frac{1}{2} + \frac{1}{2} - \frac{1}{4} + \frac{1}{4} - \frac{1}{8} + \frac{1}{8} - \frac{1}{16} + \frac{1}{16} - \frac{1}{32} + \frac{1}{32} - \frac{1}{64} + \frac{1}{64} - \frac{1}{128} + \frac{1}{128} - \frac{1}{256} + \frac{1}{256} - \frac{1}{512} + \frac{1}{512} - \frac{1}{1024} + \frac{1}{1024} - \frac{1}{2048} + \frac{1}{2048} - \frac{1}{4096} + \frac{1}{4096} - \frac{1}{8192} + \frac{1}{8192} - \frac{1}{16384} + \frac{1}{16384} - \frac{1}{32768} + \frac{1}{32768} - \frac{1}{65536} + \frac{1}{65536} - \frac{1}{131072} + \frac{1}{131072} - \frac{1}{262144} + \frac{1}{262144} - \frac{1}{524288} + \frac{1}{524288} - \frac{1}{1048576} + \frac{1}{1048576} - \frac{1}{2097152} + \frac{1}{2097152} - \frac{1}{4194304} + \frac{1}{4194304} - \frac{1}{8388608} + \frac{1}{8388608} - \frac{1}{16777216} + \frac{1}{16777216} - \frac{1}{33554432} + \frac{1}{33554432} - 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it becomes a parallelogram, whose base is the periphery of the circle of the base of the cylinder stretched into a right line, and whose height is the same with the height of the cylinder.

PROPOSITION XL.

FIG. 20. *To measure the surface of a right cone.*—The surface of a right cone is very little different from the surface of a right pyramid, having an ordinate polygon for its base of an infinite number of sides; the surface of which (excluding the base) is equal to the sum of the triangles. The sum of the bases of these triangles is equal to the periphery of the circle of the base, and the common height of the triangles is the side of the cone AB; wherefore the sum of these triangles is equal to the product of the sum of the bases (i. e. the periphery of the base of the cone) multiplied into the half of the common height, or it is equal to the product of the periphery of the base.

If the area of the base is likewise wanted, it is to be found separately by the 33d prop. If the surface of a cone is supposed to be spread out on a plane, it will become a sector of a circle, whose radius is the side of the cone; and the arc terminating the sector is made from the periphery of the base. Whence, by corol. 33d prop. of this, its dimension may be found.

COROLLARY.

Hence it will be easy to measure the surface of a *frustum* of a cone cut by a plane parallel to the base.

PROPOSITION XLI.

FIG. 21. *To measure the surface of a given sphere.*—Let there be a sphere, whose centre is A, and let the area of its convex surface be required. Archimedes demonstrates (37th prop. 1. book of the sphere and cylinder) that its surface is equal to the area of four great circles of the sphere; that is, let the area of the great circle be multiplied by 4, and the product will give the area of the sphere; or (by the 20th 6. and 2d 12. of Eucl.) the area of the sphere given is equal to the area of a circle whose radius is the right line BG, the diameter of the sphere. Therefore having measured (by 33d prop.) the circle described with the radius BC, this will give the surface of the sphere.

PROPOSITION XLII.

FIG. 22. *To measure the surface of a segment of a sphere.*—Let there be a segment cut off by the plane ED. Archimedes demonstrates (49. and 50. 1. *De sphaera*) that the surface of this segment, excluding the circular base, is equal to the area of a circle whose radius is the right line BE drawn from the vertex B of the segment to the periphery of the circle DE. Therefore (by the 33d prop.) it is easily measured.

COROLLARY 1.

Hence that part of the surface of a sphere that lieth between two parallel planes is easily measured, by subtracting the surface of the lesser segment from the surface of the greater segment.

COROLLARY 2.

Hence likewise it follows, that the surface of a cylinder, described about a sphere (excluding the basis) is equal to the surface of the sphere, and the parts of the one to the parts of the other, intercepted between planes parallel to the basis of the cylinder.

CHAP. IV. *Of solid Figures and their Mensuration, comprehending likewise the Principles of Gauging Vessels of all Figures.*

Gauging.

As in the former part of this treatise we took an inch for the smallest measure in length, and an inch square for the smallest superficial measure; so now, in treating of the mensuration of solids, we take a cubical inch for the smallest solid measure. Of these, 109 make a Scots pint; other liquid measures depend on this, as is generally known.

In dry measures, the firloft, by statute, contains 19½ pints; and on this depend the other dry measures: therefore, if the content of any solid be given in cubical inches, it will be easy to reduce the same to the common liquid or dry measures, and conversely to reduce these to solid inches. The liquid and dry measures, in use among other nations, are known from their writers.

“As to the English liquid measures, by act of parliament 1706, any round vessel commonly called a *cylinder*, having an even bottom, being seven inches in diameter throughout, and six inches deep from the top of the inside to the bottom (which vessel will be found by computation to contain $230\frac{907}{1000}$ cubical inches), or any vessel containing 231 cubical inches, and no more, is deemed to be a lawful wine-gallon. An English pint therefore contains $28\frac{7}{8}$ cubical inches; 2 pints make a quart; 4 quarts a gallon; 18 gallons a roundlet; 3 roundlets and an half, or 63 gallons, make a hoghead; the half of a hoghead is a barrel: 1 hoghead and a third, or 84 gallons, make a puncheon; 1 puncheon and a half, or 126 gallons, make a pipe or butt; the third part of a pipe, or 42 gallons, make a tierce; 2 pipes, or 3 puncheons, or 4 hogheads, make a ton of wine. Though the English wine gallon is now fixed at 231 cubical inches, the standard kept in Guildhall being measured, before many persons of distinction, May 25. 1688, it was found to contain only 224 such inches.

“In the English beer-measure, a gallon contains 282 cubical inches; consequently $35\frac{1}{4}$ cubical inches make a pint, 2 pints make a quart, 4 quarts make a gallon, 9 gallons a firkin, 4 firkins a barrel. In ale, 8 gallons make a firkin, and 32 gallons make a barrel. By an act of the first of William and Mary, 34 gallons is the barrel, both for beer and ale, in all places, except within the weekly bill of mortality.

“In Scotland it is known that 4 gills make a mutchkin, 2 mutchkins make a chopin; a pint is two chopins; a quart is two pints; and a gallon is four quarts, or eight pints. The accounts of the cubical inches contained in the Scots pint vary considerably from each other. According to our author, it contains 109 cubical inches. But the standard-jugs kept by the dean of guild of Edinburgh (one of which has the year 1555, with the arms of Scotland, and the town of Edinburgh, marked upon it) having been carefully measured several times, and by different persons, the Scots pint, according to those standards, was found to contain about $103\frac{7}{8}$ cubic inches. The pewterers jugs (by which the vessels in common use are made) are said to contain sometimes betwixt 105 and 106 cubic inches. A cask that was measured by the brewers of Edinburgh, before the commissioners of ex-

Gauging.

cife in 1707, was found to contain $46\frac{3}{4}$ Scots pints; the fame vessel contained $18\frac{1}{2}$ English ale-gallons. Supposing this menfuration to be juft, the Scots pint will be to the English ale-gallon as 289 to 750; and if the English ale-gallons be fuppofed to contain 282 cubical inches, the Scots pint will contain 108.664 cubical inches. But it is fufpected, on feveral grounds, that the experiment was not made with fufficient care and exactnefs.

"The commiffioners appointed by authority of parliament to fettle the meafures and weights, in their act of Feb. 19. 1618, relate, That having caufed fill the Linlithgow firlo with water, they found that it contained $21\frac{1}{2}$ pints of the juft Stirling jug and meafure. They likewise ordain that this fhall be the juft and only firlo; and add, *That the widenefs and broadnefs of the which firlo, under and above even over within the buirds, fhall contain nineteen inches and the fixth part of an inch, and the deepnefs feven inches and a third part of an inch.* According to this act (fuppofing their experiment and computation to have been accurate) the pint contained only 99.56 cubical inches; for the content of fuch a vessel as is defcribed in the act, is 2115.85, and this divided by $21\frac{1}{2}$ gives 99.56. But by the weight of water faid to fill this firlo in the fame act, the meafure of the pint agrees nearly with the Edinburgh ftandard above mentioned.

"As for the English meafures of corn, the Winchester gallon contains $272\frac{1}{2}$ cubical inches; 2 gallons make a peck; 4 pecks, or 8 gallons (that is, 2178 cubical inches), make a bufhel; and a quarter is 8 bufhels.

"Our author fays, that $19\frac{1}{2}$ Scots pints make a firlo. But this does not appear to be agreeable to the ftatute above mentioned, nor to the ftandard-jugs. It may be conjectured, that the proportion affigned by him has been deduced from fome experiment of how many pints, according to common ufe, were contained in the firlo. For if we fuppofe thofe pints to have been each of 108.664 cubical inches, according to the experiment made in the 1707 before the commiffioners of excife, defcribed above; then $19\frac{1}{2}$ fuch pints will amount to 2118.94, cubical inches; which agrees nearly with 2115.85, the meafure of the firlo by ftatute above mentioned. But it is probable, that in this he followed the act 1587, where it is ordained, That the wheat-firlo fhall contain 19 pints and two joucattes. A wheat-firlo marked with the Linlithgow ftamps being meafured, was found to contain about 2211 cubical inches. By the ftatute of 1618, the barley-firlo was to contain 31 pints of the juft Stirling-jug.

"A Paris pint is 48 cubical Paris inches, and is nearly equal to an English wine-quart. The *Boiffeau* contains 664.68099 Paris cubical inches, or 780.36 English cubical inches.

"The Roman *amphora* was a cubical Roman foot, the *congius* was the eighth part of the *amphora*, the *sextarius* was one-fixth of the *congius*. They divided the *sextarius* like the *as* or *libra*. Of dry meafures, the *medimnus* was equal to two *amphoras*, that is, about $1\frac{1}{2}$ English legal bufhels; and the *modius* was the third part of the *amphora*."

PROPOSITION XLIII.

To find the folid content of a given prifm.—By the 29th prop. let the area of the bafe of the prifm be meafured, and be multiplied by the height of the prifm, the product will give the folid content of the prifm.

PROPOSITION XLIV.

To find the folid content of a given pyramid.—The area of the bafe being found (by the 30th prop.), let it be multiplied by the third part of the height of the pyramid, or the third part of the bafe by the height, the product will give the folid content, by 17th 12. Eucl.

COROLLARY.

If the folid content of a *frustum* of a pyramid is required, firft let the folid content of the entire pyramid be found; from which fubtract the folid content of the part that is wanting, and the folid content of the broken pyramid will remain.

PROPOSITION XLV.

To find the content of a given cylinder.—The area of the bafe being found by prop. 33. if it be a circle, and by prop. 35. if it be an ellipse (for in both cafes it is a cylinder), multiply it by the height of the cylinder, and the folid contents of the cylinder will be produced.

COROLLARY.

FIG. 23. And in this manner may be meafured the folid content of vessels and casks not much different from a cylinder, as ABCD. If towards the middle EF it be fomewhat groffer, the area of the circle of the bafe being found (by 33d prop.) and added to the area of the middle circle EF, and the half of their fum (that is, an arithmetical mean between the area of the bafe and the area of the middle circle) taken for the bafe of the vessel, and multiplied into its height, the folid content of the given vessel will be produced.

Note, That, the length of the vessel, as well as the diameters of the bafe, and of the circle EF, ought to be taken within the ftaves; for it is the folid content within the ftaves that is fought.

PROPOSITION XLVI.

To find the folid content of a given cone.—Let the area of the bafe (found by prop. 33.) be multiplied into $\frac{1}{3}$ of the height, the product will give the folid content of the cone; for by the 10th 12. Eucl. a cone is the third part of a cylinder that has the fame bafe and height.

PROPOSITION XLVII.

FIG. 24. 25. To find the folid content of a *frustum* of a cone cut by a plane parallel to the plane of the bafe.—Firft, let the height of the entire cone be found, and thence (by the preceding prop.) its folid content; from which fubtract the folid content of the cone cut off at the top, there will remain the folid content of the *frustum* of the cone.

How the content of the entire cone may be found, appears thus: Let ABCD be the *frustum* of the cone (either right or fcalenous, as in the figures 2. and 3.) let the cone ECD be fuppofed to be completed; let AG be drawn parallel to DE, and let AH and EF be perpendicular on CD; it will be (by 2d 6. Eucl.) as CG : CA :: CD : CE; but (by art. 72. of Part I.) as CA : AH :: CE : EF; confequently (by 22d 5. Eucl.)

as

gauging. as $CG : AH :: CD : EF$; that is, as the excess of the diameter of the lesser base is to the height of the frustum, so is the diameter of the greater base to the height of the entire cone.

C O R O L L A R Y.

FIG. 26. Some casks whose staves are remarkably bended about the middle, and strait towards the ends, may be taken for two portions of cones, without any considerable error. Thus $ABEF$ is a frustum of a right cone, to whose base EF , on the other side, there is another similar frustum of a cone joined, $EDCF$. The vertices of these cones, if they be supposed to be completed, will be found at G and H . Whence (by the preceding proposition) the solid content of such vessels may be found.

P R O P O S I T I O N XLVIII.

FIG. 27. A cylinder circumscribed about a sphere, that is, having its base equal to a great circle of the sphere, and its height equal to the diameter of the sphere, is to the sphere as 3 to 2.

Let $ABEC$ be the quadrant of a circle, and $ABDC$ the circumscribed square; and likewise the triangle ADC ; by the revolution of the figure about the right line AC , as axis, a hemisphere will be generated by the quadrant, a cylinder of the same base and height by the square, and a cone by the triangle. Let these three be cut any how by the plane HF , parallel to the base AB ; the section in the cylinder will be a circle whose radius is FH , in the hemisphere a circle of the radius EF , and in the cone a circle of the radius GF .

By art. 69. of Part I. EAq , or $HFq = EFq$ and FAq taken together (but $AFq = FGq$, because $AC = CD$); therefore the circle of the radius FH is equal to a circle of the radius EF , together with a circle of the radius GF ; and since this is true every where, all the circles together described by the respective radii HF (that is, the cylinder) are equal to all the circles described by the respective radii EF and FG (that is, to the hemisphere and the cone taken together); but (by the 10th 12. Eucl.) the cone generated by the triangle DAC is one third part of the cylinder generated by the square BC . Whence it follows, that the hemisphere generated by the rotation of the quadrant $ABEC$ is equal to the remaining two third parts of the cylinder, and that the whole sphere is $\frac{2}{3}$ of the double cylinder, circumscribed about it.

This is that celebrated 39th prop. 1. book of Archimedes of the sphere and cylinder; in which he determines the proportion of the cylinder to the sphere inscribed to be that of 3 to 2.

C O R O L L A R Y.

Hence it follows, that the sphere is equal to a cone whose height is equal to the semidiameter of the sphere, having for its base a circle equal to the superficies of the sphere, or to four great circles of the sphere, or to a circle whose radius is equal to the diameter of the sphere (by prop. 41. of this.) And indeed a sphere differs very little from the sum of an infinite number of cones that have their bases in the surface of the sphere, and their common vertex in the centre of the sphere; so that the superficies of the sphere (of whose dimension see prop. 41. of this) multiplied into the third part of the semidiameter, gives the solid content of the sphere.

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P R O P O S I T I O N XLIX.

FIG. 28. To find the solid content of a sector of the sphere.—A spherical sector ABC (as appears by the corollary of the preceding prop.) is very little different from an infinite number of cones, having their bases in the superficies of the sphere BEC , and their common vertex in the centre. Wherefore the spherical superficies BEC being found (by prop. 42. of this), and multiplied into the third part of AB the radius of the sphere, the product will give the solid content of the sector ABC .

C O R O L L A R Y.

It is evident how to find the solidity of a spherical segment less than a hemispherical, by subtracting the cone ABC from the sector already found. But if the spherical segment be greater than a hemisphere, the cone corresponding must be added to the sector, to make the segment.

P R O P O S I T I O N L.

FIG. 29. To find the solidity of the spheroid, and of its segments cut by planes perpendicular to the axis.—

In prop. 44. of this, it is shown, that every where $EH : EG :: CF : CD$; but circles are as the squares described upon their rays, that is, the circle of the radius EH is to the circle of the radius EG , as CFq to CDq . And since it is so every where, all the circles described with the respective rays EH (that is, the spheroid made by the rotation of the semi-ellipse AFB around the axis AB) will be to all the circles described by the respective radii EG (that is, the sphere described by the rotation of the semicircle ADB on the axis AB) as FCq to CDq ; that is, as the spheroid to the sphere on the same axis, so is the square of the other axis of the generating ellipse to the square of the axis of the sphere.

And this holds, whether the spheroid be found by a revolution around the greater or lesser axis.

C O R O L L A R Y 1.

Hence it appears, that the half of the spheroid, formed by the rotation of the space $AHFC$ around the axis AC , is double of the cone generated by the triangle AFC about the same axis; which is the 32d prop. of Archimedes of conoids and spheroids.

C O R O L L A R Y 2.

Hence, likewise, is evident the measure of segments of the spheroid cut by planes perpendicular to the axis. For the segment of the spheroid made by the rotation of the space $ANHE$, round the axis AE , is to the segment of the sphere having the same axis AC , and made by the rotation of the segment of the circle $AMGE$, as CFq to CDq .

But if the measure of this solid be wanted with less labour, by the 34th prop. of Archimedes of conoids and spheroids, it will be as BE to $AC + EB$; so is the cone generated by the rotation of the triangle AHE round the axis AE , to the segment of the sphere made by the rotation of the space $ANHE$ round the same axis AE ; which could easily be demonstrated by the method of indivisibles.

C O R O L L A R Y 3.

Hence it is easy to find the solid content of the segment of a sphere or spheroid intercepted between two parallel planes, perpendicular to the axis. This agrees as well to the oblate as to the oblong spheroid; as is obvious.

60-

COROLLARY 4.

FIG. 30. If a cask is to be valued as the middle piece of an oblong spheroid, cut by the two planes DC and FG, at right angles to the axis: first, let the solid content of the half spheroid ABCED be measured by the preceding prop. from which let the solidity of the segment DEC be subtracted, and there will remain the segment ABCD; and this doubled will give the capacity of the cask required.

The following method is generally made use of for finding the solid content of such vessels. The double area of the greatest circle, that is, of that which is described by the diameter AB at the middle of the cask, is added to the area of the circle at the end, that is, of the circle DC or FG (for they are usually equal), and the third part of this sum is taken for a mean base of the cask; which therefore multiplied into the length of the cask OP, gives the content of the vessel required.

Sometimes vessels have other figures, different from those we have mentioned; the easy methods of measuring which may be learned from those who practise this art. What hath already been delivered is sufficient for our purpose.

PROPOSITION LI.

FIG. 31. and 32. To find how much is contained in a vessel that is in part empty, whose axis is parallel to the horizon.—Let AGBH be the great circle in the middle of the cask, whose segment GBH is filled with liquor, the segment GAH being empty; the segment GBH is known, if the depth EB be known, and EH a mean proportional between the segments of the diameter AB and EB; which are found by a rod or ruler put into the vessel at the orifice. Let the basis of the cask at a medium be found, which suppose to be the circle CKDL; and let the segment KCL be similar to the segment GAH (which is either found by the rule of three, because as the circle AGBH is to the circle CKDL, so is the segment GAH to the segment KCL; or is found from the tables of segments made by authors); and the product of this segment multiplied by the length of the cask will give the liquid content remaining in the cask.

PROPOSITION LII.

To find the solid content of a regular and ordinate body.—A tetraedon being a pyramid, the solid content is found by the 44th prop. The hexaedron, or cube, being a kind of prism, it is measured by the 43d prop. An octaedron consists of two pyramids of the same square base, and of equal heights; consequently its measure is found by the 44th prop. A dodecaedron consists of 12 pyramids having equal equilateral and equiangular pentagonal bases; and so one of these being measured (by the 44th prop. of this), and multiplied by 12, the product will be equal to the solid content of the dodecaedron. The icosaedron consists of 20 equal pyramids having triangular bases; the solid content of one of which being found (by the 44th prop.), and multiplied by 20, gives the whole solid. The bases and heights of these pyramids, if you want to proceed more exactly, may be found by trigonometry. See TRIGONOMETRY.

PROPOSITION LIII.

To find the solid content of a body however irregular.—Let the given body be immersed into a vessel of

water, having the figure of a parallelopipedon or prism, and let it be noted how much the water is raised upon the immersion of the body. For it is plain, that the space which the water fills, after the immersion of the body, exceeds the space filled before its immersion, by a space equal to the solid content of the body, however irregular. But when this excess is of the figure of a parallelopipedon or prism, it is easily measured by the 43d prop. of this, viz. by multiplying the area of the base, or mouth of the vessel, into the difference of the elevations of the water before and after immersion: Whence is found the solid content of the body given.

In the same way the solid content of a part of a body may be found, by immersing that part only in water.

There is no necessity to insist here on diminishing or enlarging solid bodies in a given proportion. It will be easy to deduce these things from the 11th and 12th books of Euclid.

“The following rules are subjoined for the ready computation of contents of vessels, and of any solids in the measures in use in Great Britain.

“I. To find the content of a cylindric vessel in English wine gallons, the diameter of the base and altitude of the vessel being given in inches and decimals of an inch.

“Square the number of inches in the diameter of the vessel; multiply this square by the number of inches in the height: then multiply the product by the decimal fraction .0034; and this last product shall give the content in wine-gallons and decimals of such a gallon. To express the rule arithmetically; let D represent the number of inches and decimals of an inch in the diameter of the vessel, and H the decimals of an inch in the height of the vessel; then the content in wine-gallons shall be $DDH \times \frac{34}{10000}$, or $DDH \times .0034$. Ex. Let the diameter $D = 51.2$ inches, the height $H = 62.3$ inches, then the content shall be $51.2 \times 51.2 \times 62.3 \times .0034 = 555.27.332$ wine-gallons. This rule follows from prop. 33. and 45. For by the former, the area of the base of the vessel is in square inches $DD \times .7854$; and by the latter, the content of the vessel in solid inches is $DDH \times .7854$; which divided by 231 (the number of cubical inches in a wine-gallon) gives $DDH \times .0034$, the content in wine gallons. But though the charges in the excise are made (by statute) on the supposition that the wine-gallon contains 231 cubical inches; yet it is said, that in sale 224 cubical inches, the content of the standard measured at Guildhall (as was mentioned above), are allowed to be a wine-gallon.

“II. Supposing the English ale-gallon to contain 282 cubical inches, the content of a cylindric vessel is computed in such gallons, by multiplying the square of the diameter of a vessel by its height as formerly, and their product by the decimal fraction .0,027,851: that is, the solid content in ale-gallons is $DDH \times .0,027,851$.

“III. Supposing the Scots pint to contain about 103.4 cubical inches (which is the measure given by the standards at Edinburgh, according to experiments mentioned above), the content of a cylindric vessel is computed in Scots pints, by multiplying the square of the diameter of the vessel by its height, and the product

Gauging. duct of these by the decimal fraction .0076. Or the content of such a vessel in Scots pints is $DDH \times 0.076$.

"Supposing the Winchester bushel to contain 2187 cubical inches, the content of a cylindric vessel is computed in those bushels by multiplying the square of the diameter of the vessel by the height, and the product by the decimal fraction .0,003,606. But the standard bushel having been measured by Mr Everard and others in 1696, it was found to contain only 2145.6 solid inches; and therefore it was enacted in the act for laying a duty upon malt, *That every round bushel, with a plain and even bottom, being 18½ inches diameter throughout, and 8 inches deep, should be esteemed a legal Winchester bushel.* According to this act (ratified in the first year of queen Anne) the legal Winchester bushel contains only 2150.42 solid inches. And the content of a cylindric vessel is computed in such bushels, by multiplying the square of the diameter by the height, and their product by the decimal fraction .0,003,625. Or the content of the vessel in those bushels is $DDH \times 0.003,625$.

"V. Supposing the Scots wheat-firiot to contain $21\frac{1}{4}$ Scots pints (as is appointed by the statute 1618), and the pint to be conform to the Edinburgh standards above mentioned, the contents of a cylindric vessel in such firlots is computed by multiplying the square of the diameter by the height, and their product by the decimal fraction .00,358. This firiot, in 1426, is appointed to contain 17 pints; in 1457, it was appointed to contain 18 pints; in 1587, it is $19\frac{1}{4}$ pints; in 1628, it is $21\frac{1}{4}$ pints: and though this last statute appears to have been founded on wrong computations in several respects, yet this part of that act that relates to the number of pints in the firiot seems to be the least exceptionable; and therefore we suppose the firiot to contain $21\frac{1}{4}$ pints of the Edinburgh standard, or about 2197 cubical inches; which a little exceeds the Winchester bushel, from which it may have been originally copied.

"VI. Supposing the bear-firiot to contain 31 Scots pints (according to the statute 1618), and the pint conform to the Edinburgh standards, the content of a cylindric vessel in such firlots is found by multiplying the square of the diameter by the height, and this product by .000245.

"When the section of the vessel is not a circle, but an ellipsis, the product of the greatest diameter by the least is to be substituted in those rules for the square of the diameter.

"VII. To compute the content of a vessel that may be considered as a frustum of a cone in any of those measures.

"Let A represent the number of inches in the diameter of the greater base, B the number of inches in the diameter of the lesser base. Compute the square of A, the product of A multiplied by B, and the square of B, and collect these into a sum. Then find the third part of this sum, and substitute it in the preceding rules in the place of the square of the diameter; and proceed in all other respects as before. Thus, for example, the content in wine-gallons in $AA \times AB \times BB \times \frac{1}{3} \times H \times .0034$.

"Or, to the square of half the sum of the diameters A and B, add one-third part of the square of

half their difference, and substitute this sum in the preceding rules for the square of the diameter of the vessel; for the square of $\frac{1}{2}A \times \frac{1}{2}B$ added to $\frac{1}{3}$ of the square of $\frac{1}{2}A - \frac{1}{2}B$, gives $\frac{1}{3}AA \times \frac{1}{3}AB \times \frac{1}{3}BB$.

"VIII. When a vessel is a frustum of a parabolic conoid, measure the diameter of the section at the middle of the height of the frustum; and the content will be precisely the same as of a cylinder of this diameter of the same height with the vessel.

"IX. When a vessel is a frustum of a sphere, if you measure the diameter of the section at the middle of the height of the frustum, then compute the content of a cylinder of this diameter of the same height with the vessel, and from this subtract $\frac{1}{4}$ of the content of a cylinder of the same height on a base whose diameter is equal to its height; the remainder will give the content of the vessel. That is, if D represent the diameter of the middle section, and H the height of the frustum, you are to substitute $DD - \frac{1}{4}HH$ for the square of the diameter of the cylindric vessel in the first six rules.

"X. When the vessel is a frustum of a spheroid, if the bases are equal, the content is readily found by the rule in p. 685. In other cases, let the axis of the solid be to the conjugate axis as n to 1; let D be the diameter of the middle section of the frustum, H the height or length of the frustum; and substitute in the first six rules $DD - \frac{HH}{3n^2}$ for the square of the diameter of the vessel.

"XI. When the vessel is an hyperbolic conoid, let the axis of the solid be to the conjugate axis as n to 1, D the diameter of the section at the middle of the frustum, H the height or length: compute $DD \times \frac{1}{3n^2} \times HH$, and substitute this sum for the square of the diameter of the cylindric vessel in the first six rules.

"XII. In general, it is usual to measure any round vessel, by distinguishing it into several frustums, and taking the diameter of the section at the middle of each frustum; thence to compute the content of each, as if it was a cylinder of that mean diameter; and to give their sum as the content of the vessel. From the total content, computed in this manner, they subtract successively the numbers which express the circular areas that correspond to those mean diameters, each as often as there are inches in the altitude of the frustum to which it belongs, beginning with the uppermost; and in this manner calculate a table for the vessel, by which it readily appears how much liquor is at any time contained in it, by taking either the dry or wet inches; having regard to the inclination or drip of the vessel when it has any.

"This method of computing the content of a frustum from the diameter of the section at the middle of its height, is exact in that case only when it is a portion of a parabolic conoid; but in such vessels as are in common use, the error is not considerable. When the vessel is a portion of a cone or hyperbolic conoid, the content by this method is found less than the truth; but when it is a portion of a sphere or spheroid, the content computed in this manner exceeds the truth. The difference or error is always the same in the different parts of the same or of similar vessels, when the altitude of the frustum is given. And when the altitudes are different, the error is in the triplicate ratio

of

Gauging. of the altitude. If exactness be required, the error in measuring the frustum of a conical vessel in this manner is $\frac{1}{4}$ of the content of a cone similar to the vessel, of an altitude equal to the height of the frustum. In a sphere, it is $\frac{1}{4}$ of a cylinder of a diameter and height equal to the frustum. In the spheroid and hyperbolic conoid, it is the same as in a cone generated by the right-angled triangle, contained by the two semiaxes of the figure, revolving about that side which is the semiaxis of the frustum.

"In the usual method of computing a table for a vessel, by subtracting from the whole content the number that expresses the uppermost area as often as there are inches in the uppermost frustum, and afterwards the numbers for the other areas successively; it is obvious, that the contents assigned by the table, when a few of the uppermost inches are dry, are stated a little too high if the vessel stands upon its base, but too low when it stands on its greater base; because, when one inch is dry, for example, it is not the area at the middle of the uppermost frustum, but rather the area at the middle of the uppermost inch, that ought to be subtracted from the total content, in order to find the content in this case.

"XIII. To measure round timber: Let the mean circumference be found in feet and decimals of a foot; square it; multiply this square by the decimal .079,577, and the product by the length. *Ex.* Let the mean circumference of a tree be 103 feet, and the length 24 feet. Then $103 \times 103 \times .079,577 \times 24 = 202.615$, is the number of cubical feet in the tree. The foundation of this rule is, that when the circumference of a circle is 1, the area is .0795,774,715, and that the areas of circles are as the squares of their circumferences.

"But the common way used by artificers for measuring round timber, differs much from this rule. They call one fourth part of the circumference the *girt*, which is by them reckoned the side of a square, whose area is equal to the area of the section of the tree; therefore they square the *girt*, and then multiply by the length of the tree. According to their method, the tree of the last example would be computed at 159.13 cubical feet only.

"How square timber is measured, will be easily understood from the preceding propositions. Fifty solid feet of hewn timber, and forty of rough timber, make a load.

"XIV. To find the burden of a ship, or the number of tons it will carry, the following rule is commonly given. Multiply the length of the keel taken within board, by the breadth of the ship within board, taken from the midship beam from plank to plank, and the product by the depth of the hold, taken from the plank below the keelson to the under part of the upper deck plank, and divide the product by 94, the quotient is the content of the tonnage required. This rule, however, cannot be accurate; nor can one rule be supposed to serve for the measuring exactly the burden of ships of all sorts. Of this the reader will find more in the Memoirs of the Royal Academy of Sciences at Paris for the year 1721.

"Our author having said nothing of weights, it may be of use to add briefly, that the English Troy-pound contains 12 ounces, the ounce 20 penny-weight, and the penny-weight 24 grains; that the Averdupois pound contains 16 ounces, the ounce 16 drams, and that 112 pounds is usually called the hundred weight. It is commonly supposed, that 14 pounds Averdupois are equal to 17 pounds Troy. According to Mr Everard's experiments, 1 pound Averdupois is equal to 14 ounces 12 penny-weight and 16 grains Troy, that is, to 7000 grains; and an Averdupois ounce is $437\frac{1}{2}$ grains. The Scots Troy-pound (which, by the statute 1718, was to be the same with the French) is commonly supposed equal to $15\frac{1}{2}$ ounces English Troy, or 7560 grains. By a mean of standards kept by the dean of guild at Edinburgh, it is $7599\frac{1}{2}$ or 7600 grains. They who have measured the weights which were sent from London after the union of the kingdoms to be the standards by which the weights in Scotland should be made, have found the English Averdupois pound (from a medium of the several weights) to weigh 7000 grains, the same as Mr Everard; according to which, the Scots, Paris, or Amsterdam pound, will be to the pound Averdupois as 38 to 35. The Scots Troy-stone contains 16 pounds, the pound 2 marks or 16 ounces, an ounce 16 drops, a drop 36 grains. Twenty Scots ounces make a Tron-pound; but because it is usual to allow one to the score, the Tron-pound is commonly 21 ounces. Sir John Skene, however, makes the Tron-stone to contain only $19\frac{1}{2}$ pounds."

G E O

George.

GEORGE I. II. and III. kings of Great Britain. —George I. the son of Ernest Augustus, duke of Brunswick Lunenburgh, and elector of Hanover; succeeded to the throne of Great Britain in 1714, in virtue of an act of parliament, passed in the latter part of the reign of king William III. limiting the succession of the crown, after the demise of that monarch, and queen Anne (without issue), to the princess Sophia of Hanover, and the heirs of her body, being Protestants. —George II. the only son of the former, succeeded him in 1727, and enjoyed a long reign of glory; dying amidst the most rapid and extensive conquests in the 77th year of his age. He was succeeded by No 138.

G E O

his grandson George III. our present sovereign. For particulars, see BRITAIN, No 374—701.

GEORGE, or *Knights of St GEORGE*, has been the denomination of several military orders, whereof that of the garter is one of the most illustrious. See GARTER, and St GEORGE, below.

King GEORGE'S Islands, are two islands in the South Sea, lying in W. Long. 144. 56. S. Lat. 14. 28. They were first discovered by commodore Byron in 1765, and have since been visited by Captain Cook in 1774. Commodore Byron's people had an encounter with the inhabitants, which proved fatal to some of the natives; but Captain Cook was more fortunate. A lieutenant and

George.

and two boats well armed were sent on shore by Captain Cook; and landed without opposition. As soon as the gentlemen landed, the islanders embraced them by touching noses, a mode of civility used in New Zealand, which is 900 leagues distant, and the only place besides this where the custom has been observed to prevail. Notwithstanding this ceremony, however, very little real friendship seemed to take place on the part of the islanders. They crowded about the boats as the people were stepping into them, and seemed in doubt whether they should detain them or let them go; at last, however, not thinking themselves sufficiently strong, they seemed contented with their departure, and assisted them in pushing off their boats; but some of the most turbulent threw stones into the water which fell very near them, and all seemed to glory that they had as it were driven them off. The British, however, brought off five dogs of a white colour with fine long hair, with which the island seemed to be plentifully supplied. These they purchased with small nails, and some ripe bananas which had been brought from the Marquesas. On this island Mr Forester found a kind of scurvy-grass, which the natives informed him they were wont to bruise and mix with shell-fish; after which, they threw it into the sea whenever they perceived a shoal of fish. This preparation intoxicates them for some time; and thus they are caught on the surface of the water without any other trouble than that of taking them out. The name of this plant among the natives is *e now*. The largest island, which they call *Tiookea*, is something of an oval shape, and about 10 leagues in circuit; the other island, which lies two leagues to the westward of *Tiookea*, is four leagues long from north-east to south-west, and from five to three miles broad. The soil of both is extremely scanty; the foundation consists of coral, very little elevated above the surface of the water.

GEORGE (St) or *GEORGE of Cappadocia*; a name whereby several orders, both military and religious, are denominated. It took its rise from a saint or hero famous throughout all the East, called by the Greeks Μεγαλομάρτυρ, q. d. *great martyr*.

On some medals of the emperors John and Manuel Comneni, we have the figure of St George armed, holding a sword or javelin in one hand, and in the other a buckler, with this inscription; an O, and therein a little

P
A, and ΓΕ—ΠΙΟC, making Ο ΑΓΙΟΣ ΓΕΩΡΓΙΟΣ, *O holy O*

George. He is generally represented on horseback, as being supposed to have frequently engaged in combats in that manner. He is highly venerated throughout Armenia, Muscovy, and all the countries which adhere to the Greek rite: from the Greek, his worship has long ago been received into the Latin church; and England and Portugal have both chosen him for their patron saint.

Great difficulties have been raised about this saint or hero. His very-existence has been called in question. Dr Heylin, who wrote first and most about him, concluded with giving him entirely up, and supposing him only a symbolical device; and Dr Pettingal has turned him into a mere Basilidian symbol of victory. Mr Pegg, in a paper in the *Archæologia**, has attempted to restore him. And, finally, Mr Gibbon † has sunk him into an Arian bishop in the reigns of Constantius and Julian.—The bishop alluded to,

GEORGE the Cappadocian, was so furnished, according to our author, from his parents or education; and was born at Epiphania in Cilicia, in a fuller's shop. "From this obscure and servile origin he raised himself by the talents of a parasite: and the patrons, whom he assiduously flattered, procured for their worthless dependent a lucrative commission, or contract, to supply the army with bacon. His employment was mean: he rendered it infamous. He accumulated wealth by the basest arts of fraud and corruption; but his malversations were so notorious, that George was compelled to escape from the pursuits of justice. After this disgrace, in which he appears to have saved his fortune at the expence of his honour, he embraced, with real or affected zeal, the profession of Arianism. From the love, or the ostentation, of learning, he collected a valuable library of history, rhetoric, philosophy, and theology; and the choice of the prevailing faction promoted George of Cappadocia to the throne of Athanasius." His conduct in this station is represented by our historian as polluted by cruelty and avarice, and his death considered as a just punishment for the enormities of his life, among which Mr Gibbon seems to rank his "enmity to the Gods."

The immediate occasion of his death, however, as narrated by ecclesiastical writers, will not probably appear calculated to add any stain to his memory. "There was in the city of Alexandria a place in which the heathen priests had been used to offer human sacrifices. This place, as being of no use, Constantius gave to the church of Alexandria, and George the bishop gave orders for it to be cleared, in order to build a Christian church on the spot. In doing this they discovered an immense subterraneous cavern, in which the heathen mysteries had been performed, and in it were many human skulls. These, and other things which they found in the place, the Christians brought out and exposed to public ridicule. The heathens, provoked at this exhibition, suddenly took arms, and rushing upon the Christians, killed many of them with swords, clubs, and stones: some also they strangled, and several they crucified. On this the Christians proceeded no farther in clearing the temple; but the heathens, pursuing their advantage, seized the bishop as he was in the church, and put him in prison. The next day they dispatched him; and then fastening the body to a camel, he was dragged about the streets all day, and in the evening they burnt him and the camel together. This fate, Sozomen says, the bishop owed in part to his haughtiness while he was in favour with Constantius, and some say the friends of Athanasius were concerned in this massacre; but he ascribes it chiefly to the inveteracy of the heathens, whose superstitions he had been very active in abolishing.

"This George, the Arian bishop of Alexandria, was a man of letters, and had a very valuable library, which Julian ordered to be seized for his own use; and in his orders concerning it, he says that many of the books were on philosophical and rhetorical subjects, though many of them related to the doctrine of the impious Galileans (as in his sneering contemptuous way he always affected to call the Christians). 'These books (says he) I could wish to have utterly destroyed; but lest books of value should be destroyed along with them, let these also be carefully fought for.'

George.

George.

But Mr Gibbon gives a different turn to the affair of George's murder, as well as relates it with different circumstances. "The Pagans (says he) excited his devout avarice; and the rich temples of Alexandria were either pillaged or insulted by the haughty prelate, who exclaimed, in a loud and threatening tone, 'How long will these sepulchres be permitted to stand?' Under the reign of Constantius, he was expelled by the fury, or rather by the justice, of the people; and it was not without a violent struggle, that the civil and military powers of the state could restore his authority, and gratify his revenge. The messenger who proclaimed at Alexandria the accession of Julian, announced the downfall of the archbishop. George, with two of his obsequious ministers, count Diodorus, and Dracontius master of the mint, was ignominiously dragged in chains to the public prison. At the end of 24 days, the prison was forced open by the rage of a superstitious multitude, impatient of the tedious forms of judicial proceedings. The *enemies of gods* and men expired under their cruel insults; the lifeless bodies of the archbishop and his associates were carried in triumph through the streets on the back of a camel; and the inactivity of the Athanasian party was esteemed a shining example of evangelical patience. The remains of these guilty wretches were thrown into the sea; and the popular leaders of the tumult declared their resolution to disappoint the devotion of the Christians, and to intercept the future honours of these martyrs, who had been punished, like their predecessors, by the enemies of their religion. The fears of the Pagans were just, and their precautions ineffectual. The meritorious death of the archbishop obliterated the memory of his life. The rival of Athanasius was dear and sacred to the Arians, and the seeming conversion of those sectaries introduced his worship into the bosom of the Catholic church. The odious stranger, disguising every circumstance of time and place, assumed the mask of a martyr, a saint, and a Christian hero; and the infamous George of Cappadocia has been transformed into the renowned St George of England, the patron of arms, of chivalry, and of the garter."

Knights of St GEORGE. See GARTER. There have been various other orders under this denomination, most of which are now extinct; particularly one founded by the emperor Frederic III. in the year 1470, to guard the frontiers of Bohemia and Hungary against the Turks; another, called *St George of Alfama*, founded by the kings of Arragon; another in Austria and Carinthia; and another in the republic of Genoa, still subsisting, &c.

Religious of St GEORGE. Of these there are divers orders and congregations; particularly canons regular of St George in Alga, at Venice, established by authority of pope Boniface IX. in the year 1404. The foundation of this order was laid by Bartholomew Colonna, who preached, in 1396, at Padua, and some other villages in the state of Venice. Pope Pius V. in 1570, gave these canons precedence of all other religious. Another congregation of the same institute in Sicily, &c.

St GEORGE del Mina, the capital of the Dutch settlements, on the gold-coasts of Guinea, situated seven or eight miles west of Cape-coast castle, the capi-

tal of the British settlements there. W. Long. 5°. and N. Lat. 5°.

St GEORGE, a fort and town of Asia, in the peninsula on this side the Ganges, and on the coast of Coromandel, belonging to the British; it is otherwise called *Madras*, and by the natives *Chili-patam*. It fronts the sea, and has a salt-water river on its back side, which hinders the fresh-water springs from coming near the town, so that they have no good water within a mile of them. In the rainy seasons it is incommoded by inundations; and from April to September, it is so scorching hot, that if the sea-breezes did not cool the air, there would be no living there. There are two towns, one of which is called the *White Town*, which is walled round, and has several bulwarks and bastions to defend it: it is 400 paces long and 150 broad, and is divided into regular streets. Here are two churches, one for the Protestants, and the other for the Papists; as also a good hospital, a town hall, and a prison for debtors. They are a corporation, and have a mayor and aldermen, with other proper officers. The *Black Town* is inhabited by Gentoos, Mahometans, and Portuguese and Armenian Christians, and each religion have their temples and churches. This, as well as the White Town, is ruled by the English governor and his council. The diamond-mines are but a week's journey from this place, which renders them pretty plentiful, but there are no large ones since that great diamond was procured by governor Pitt. This colony produces very little of its own growth or manufacture for foreign markets, and the trade is in the hands of the Armenians and Gentoos. The chief things the British deal in, besides diamonds, are calicoes, chintz, muslins, and the like. This colony may consist of 80,000 inhabitants in the towns and villages, and there are generally 400 or 500 Europeans. Their rice is brought by sea to Gangam and Orixia, their wheat from Surat and Bengal, and their fire-wood from the islands of Diu: so that an enemy, with a superior force at sea, may easily distress them. The houses of the White Town are built with brick, and have lofty rooms and flat roofs; but the Black Town consists chiefly of thatched cottages. The military power is lodged in the governor and council, who are also the last resort in civil causes. The company have two chaplains, who officiate by turns, and have each 100l. a-year, besides the advantages of trade. They never attempt to make proselytes, but leave that to the Popish missionaries. The salaries of the company's writers are very small: but, if they have any fortune of their own, they may make it up by trade; which must generally be the case, for they commonly grow rich. It was taken by the French in 1746, who restored it at the peace of Aix-la-Chapelle.

St GEORGE'S, the largest of the Bermuda or Summer islands. W. Long. 65. 10. N. Lat. 32. 30.

Cross of St GEORGE, a red one in a field argent, which makes part of the British standard.

GEORGIA, a country of Asia, bounded on the north by Circassia, on the east by Daghestan and Shirvan, on the south by Armenia, and on the west by the Euxine or Black Sea; comprehending the greatest part of the ancient Colchis, Iberia, and Albania. About the etymon of the name of this country, authors are not agreed. The most probable opinion

Georgia. is, that it is a corruption by softening of *Kurgia*, from the river Kur; whence also it is supposed that the inhabitants are called by the Persians indifferently *Gurgi* and *Kurgi*; and the country *Kurgistan* and *Gurgistan*: It is divided by a ridge of mountains into eastern and western; the former of which is again subdivided into the kingdoms of Caket, Carduel or Carthuel, and Goguetia; and the latter into the provinces of Abcassia, Mireta, or Imaretta, and Guriel. Another division is into Georgia Proper, Abcassia, and Mingrelia. A third division will be afterwards mentioned.

“Georgia (says Sir George Chardin) is as fertile a country as can be seen; the bread is as good here as in any part of the world; the fruit of an exquisite flavour, and of different sorts; no place in Europe yields better pears and apples, and no place in Asia better pomegranates. The country abounds with cattle, venison, and wild-fowl, of all sorts; the river Kur is well stocked with fish; and the wine is so rich, that the king of Persia has always some of it for his own table. The inhabitants are robust, valiant, and of a jovial temper; great lovers of wine, and esteemed very trusty, and faithful; endowed with good natural parts, but, for want of education, very vicious. The women are generally so fair and comely,* that the wives and concubines of the king of Persia and his court are for the most part Georgian women. Nature has adorned them with graces no where else to be met with: it is impossible to see them without loving them; they are of a good size, clean-limbed, and well-shaped.” Another traveller, however, of no mean character, thus expresses himself with respect to the women: “As to the Georgian women, they did not at all surprise us; for we expected to find them perfect beauties. They are, indeed, no way disagreeable; and may be counted beauties, if compared with the Curdes. They have an air of health that is pleasing enough; but, after all, they are neither so handsome nor so well shaped as is reported. Those who live in the towns have nothing extraordinary more than the others; so that I may, I think, venture to contradict the accounts that have been given of them by most travellers.”

This country formerly abounded with great cities, as appears not only from its history, but from the ruins of many of them still visible, which show that they must have been very large, opulent, and magnificently built. These were all destroyed by the inundations of northern barbarians from mount Caucasus, as the A-lans, Huns, Suevi, and some others, so much noted in history for their strength, courage, and conquests.

The latest division of this country is into nine provinces; five of which are subject to the famous prince Heraclius, forming what is commonly called the kingdom of Georgia; and four are under the dominion of David, composing the kingdom or principality of Imeretia. See IMERETIA.

This whole country is so extremely beautiful, that some fanciful travellers have imagined they had here found the situation of the original garden of Eden. The hills are covered with forests of oak, ash, beech, chestnuts, walnuts, and elms, encircled with vines, growing perfectly wild, but producing vast quantities of grapes. From these is annually made as much wine as is necessary for the yearly consumption; the re-

mainder are left to rot on the vines. Cotton grows Georgia. spontaneously, as well as the finest European fruit-trees. Rice, wheat, millet, hemp, and flax, are raised on the plains, almost without culture. The valleys afford the finest pasturage in the world; the rivers are full of fish; the mountains abound in minerals, and the climate is delicious; so that nature appears to have lavished on this favoured country every production that can contribute to the happiness of its inhabitants.

On the other hand, the rivers of Georgia, being fed by mountain torrents, are at all seasons either too rapid or too shallow for the purposes of navigation: the Black Sea, by which commerce and civilization might be introduced from Europe, has been till very lately in the exclusive possession of the Turks: the trade of Georgia by land is greatly obstructed by the high mountains of Caucasus: and this obstacle is still increased by the swarms of predatory nations, by which those mountains are inhabited.

It is said, that in the 15th century, a king of Georgia divided among his five sons the provinces of Carduel and Caket, Imeretia, Mingrelia, Guriel, and Abkhazia. These petty princes were too jealous to unite for their common defence, and too weak singly to resist a foreign enemy, or even to check the incroachments of their great vassals, who soon became independent. By forming a party among these nobles, the Turks gradually gained possession of all the western provinces, while the Persians occupied the governments of Carduel and Caket. Since that period the many unsuccessful attempts of the Georgians to recover their liberty, have repeatedly produced the devastation of their country. Abbas the Great is said to have carried off in one expedition from the provinces of Carduel and Caket no less than 80,000 families, a number which, probably, exceeds the whole actual population of those provinces. The most horrible cruelties were again exercised on the unhappy people, at the beginning of the present century, by the merciless Nadir; but these were trifling evils, compared with those arising from the internal dissensions of the great barons. This numerous body of men, idle, arrogant, and ferocious, possessed of an unlimited power over the lives and properties of their vassals, having no employment but that of arms, and no hopes of aggrandizing themselves but by the plunder of their rivals, were constantly in a state of warfare; and as their success was various, and the peasants of the vanquished were constantly carried off and sold to the Turks or Persians, every expedition increased the depopulation of the country. At length they invited the neighbouring mountaineers, by the hopes of plunder, to take part in their quarrels; and these dangerous allies, becoming acquainted with the country, and being spectators of the weakness of its inhabitants, soon completed its desolation. A few squalid wretches, half naked, half starved, and driven to despair by the merciless exactions of their landlords, are thinly dispersed over the most beautiful provinces of Georgia. The revolutions of Persia, and the weakness of the Turks, have indeed enabled the princes of the country to recover their independence; but the smallness of their revenue has hitherto disabled them from repressing effectually the tyranny of the nobles, and relieving the burdens of the peasants.

Georgia.

The capital of Georgia is Teflis, where prince Heraclius resides (See *TEFLIS*.) Of this prince, so celebrated for his exploits and successes in shaking off the Ottoman yoke, we have the following account by the late professor Guldenstaedt when he travelled into these parts in 1770. "Heraclius, or, as he is called, the tzar Iracli, is above 60 years old, of a middle size, with a long countenance, a dark complexion, large eyes, and a small beard. He passed his youth at the court and in the army of the celebrated Nadir Shah, where he contracted a fondness for Persian customs and manners, which he has introduced into his kingdom. He has seven sons and six daughters. He is much revered and dreaded by the Persian khans his neighbours; and is usually chosen to mediate between them in their disputes with each other. When they are at war, he supports one of the parties with a few troops, who diffuse a spirit and courage among the rest, because the Georgian soldiers are esteemed the bravest of those parts; and prince Heraclius himself is renowned for his courage and military skill. When on horseback he has always a pair of loaded pistols at his girdle, and, if the enemy is near, a musket slung over his shoulder. In all engagements he is the foremost to give examples of personal bravery; and frequently charges the enemy at the head of his troops with the sabre in his hand. He loves pomp and expense; he has adopted the dress of Persia; and regulates his court after the manner of that country. From the example of the Russian troops, who were quartered in Georgia during the last Turkish war, he has learnt the use of plates, knives, and forks, dishes and household-furniture, &c."

The subjects of Heraclius are estimated at about 60,000 families; but this, notwithstanding the present desolated state of the country, is probably an under valuation. The peasants belonging to the queen, and those of the patriarch, pay no tax to the prince, and therefore do not appear on the books of the revenue officers. Many similar exemptions have likewise been granted by the prince to his sons-in-law, and his favourites. Besides, as the impost on the peasants is not a poll-tax, but a tax on hearths, the inhabitants of a village, on the approach of the collectors, frequently carry the furniture of several huts into one, and destroy the remainder, which are afterwards very easily replaced. It is probable, therefore, that the population of Georgia does not fall short of 350,000 souls. The revenues may be estimated at about 150,000 roubles, or 26,250 l. They consist of, 1. The customs, farmed at 1750 l.—2. Rent paid by the farmers of the mint at Teflis, 1750 l.—3. The tribute paid by the Khans of Erivan and Ganjha, 7000 l.—and, 4. The hearth money levied on the peasants, amounting to 15,750 l. The common coins here are the abasses, of about 15 d. value, and a small copper coin, stamped at the mint at Teflis. Besides these, a large quantity of gold and silver money is brought into the country from Persia and Turkey, in exchange for honey, butter, cattle, and blue linens.

The government of Georgia is despotic; but, were it not for the assistance of the Russian troops, the prince would be frequently unable to carry his decrees into execution. The punishments in criminal cases are shockingly cruel; fortunately they are not frequent,

because it is seldom difficult to escape into some of the neighbouring countries, and because the prince is more enriched by confiscating the property of the criminal, than by putting him to torture. Judicial combats are considered as the privilege of nobility, and take place when the cause is extremely intricate, or when the power and interest of two claimants are so equal, that neither can force a decision of the court in his favour. This mode of trial is called an appeal to the judgment of God.

The dress of the Georgians nearly resembles that of the Cossaks; but men of rank frequently wear the habit of Persia. They usually dye their hair, beard, and nails with red. The Georgian women employ the same colour to stain the palms of their hands. On their heads they wear a cap or fillet, under which their black hair falls on their forehead: behind, it is braided into several tresses. Their eye-brows are painted with black, in such a manner as to form one entire line, and their faces are perfectly coated with white and red. Their robe is open to the girdle, so that they are reduced to conceal the breasts with their hands. Their air and manner are extremely voluptuous. Being generally educated in convents, they can all read and write; a qualification which is very unusual among the men, even of the highest rank. Girls are betrothed as soon as possible, often at three or four years of age. In the streets the women of rank are always veiled, and then it is indecent in any man to accost them. It is likewise uncivil in conversation to inquire after the wives of any of the company. These, however, are not ancient customs, but are a consequence of the violences committed by the Persians, under Shah Nadir.

Travellers accuse the Georgians of drunkenness, superstition, cruelty, sloth, avarice, and cowardice; vices which are every where common to slaves and tyrants, and are by no means peculiar to the natives of this country. The descendants of the colonists, carried off by Shah Abbas, and settled at Peria, near Ispahan, and in Masanderan, have changed their character with their government; and the Georgian troops, employed in Persia against the Affghans, were advantageously distinguished by their docility, their discipline, and their courage.

The other inhabitants of Georgia are Tartars, Ossis, and Armenians, called in the Georgian language Somakhi. These last are found all over Georgia, sometimes mixed with the natives, and sometimes in villages of their own. They speak among themselves their own language, but all understand and can talk the Georgian. Their religion is partly the Armenian, and partly the Roman Catholic. They are the most oppressed of the inhabitants, but are still distinguished by that instinctive industry which every where characterizes the nation.

Besides these, there are in Georgia considerable numbers of Jews, called, in the language of the country, Uria. Some have villages of their own; and others are mixed with the Georgian, Armenian, and Tartar inhabitants, but never with the Ossi. They pay a small tribute above that of the natives.

GEORGIA, one of the United States of America, lying between South Carolina and Florida. It extends 120 miles upon the sea-coast, and 300 miles from

Georgia. from thence to the Apalachian mountains, and its boundaries to the north and south are the rivers Savannah and Alatamaha. The whole coast is bordered with islands; the principal of which are Skidaway, Wafflaw, Oflabaw, St Catherines, Sapelo, Frederica, Jekyl, Cumberland, and Amelia.

The settlement of a colony between the rivers Savannah and Alatamaha was meditated in England in 1732, for the accommodation of poor people in Great Britain and Ireland, and for the farther security of Carolina. Private compassion and public spirit conspired to promote the benevolent design. Humane and opulent men suggested a plan of transporting a number of indigent families to this part of America free of expence. For this purpose they applied to the king, George II. and obtained from him letters patent, bearing date June 9, 1732, for legally carrying into execution what they had generously projected. They called the new province *Georgia*, in honour of the king, who encouraged the plan. A corporation, consisting of 21 persons, was constituted by the name of, The Trustees for settling and establishing the colony of Georgia.

In November 1732, 116 settlers embarked for Georgia, to be conveyed thither free of expence, furnished with every thing requisite for building and for cultivating the soil. Mr James Oglethorpe, one of the trustees, and an active promoter of the settlement, embarked as the head and director of these settlers. They arrived at Charlestown early in the next year. Mr Oglethorpe, accompanied by William Bull, shortly after his arrival, visited Georgia; and after surveying the country, marked the spot on which Savannah now stands, as the fittest to begin their settlement. Here they accordingly began and built a small fort; a number of small huts for their defence and accommodation. Such of the settlers as were able to bear arms were embodied, and well appointed with officers, arms, and ammunition. A treaty of friendship was concluded between the settlers and their neighbours the Creek Indians, and every thing wore the aspect of peace and future prosperity. But the fundamental regulations established by the trustees of Georgia were ill adapted to the circumstances and situation of the poor settlers, and of pernicious consequences to the prosperity of the province. Yet although the trustees were greatly mistaken with respect to their plan of settlement, it must be acknowledged their views were generous. Like other distant legislators, who framed their regulations upon principles of speculation, they were liable to many errors and mistakes; and however good their design, their rules were found improper and impracticable. These injudicious regulations and restrictions, the wars in which they were involved with the Spaniards and Indians, and the frequent insurrections among themselves, threw the colony into a state of confusion and wretchedness too great for human nature long to endure. Their oppressed situation was represented to the trustees by repeated complaints; till at length finding that the province languished under their care, and weary with the complaints of the people, they in the year 1752 surrendered their charter to the king, and it was made a royal government. — In the year 1740, the Rev. George Whitefield founded an orphan-house academy in Georgia, about

12 miles from Savannah. Mr Whitefield died at Newbury Port, in New England, in October 1770, in the 56th year of his age, and was buried under the Presbyterian church in that place. From the time Georgia became a royal government in 1752, till the peace of Paris in 1763, she struggled under many difficulties arising from the want of credit, from friends, and the frequent molestations of enemies. The good effects of the peace were sensibly felt in the province of Georgia. From this time it began to flourish under the fatherly care of governor Wright. To form a judgment of the rapid growth of the colony, we need only attend to its exports. In the year 1763, they consisted of 7500 barrels of rice, 9633 pound of indigo, 1250 bushels of Indian corn, which, together with deer and beaver skins, naval stores, provisions, timber, &c, amounted to no more than L. 27,021 sterling. Ten years afterwards, in 1773, they amounted to L. 121,677 sterling. The chief articles of export from this state are rice, tobacco, indigo, sago, lumber of various kinds, naval stores, leather, deer-skins, snake-root, myrtle, bees-wax, corn, live stock, &c.

During the late war, Georgia was over-run by the British troops, and the inhabitants were obliged to flee into the neighbouring states for safety. Since the peace, the progress of the population of this state is said to have been astonishingly rapid: though it has been a good deal checked within these few years by the hostile irruptions of the Creek Indians, who continually harass the frontiers of the state. Treaties have been held, and a cessation of hostilities agreed to, between the parties; but all have hitherto proved ineffectual to the accomplishment of a peace.

These Indians inhabit the middle parts of the state, and are the most numerous tribe of Indians of any within the limits of the United States. Their whole number is 17,280, of which 5860 are fighting men. Their principal towns lie in latitude 32° and longitude 119° 20' from Philadelphia. They are settled in a hilly but not mountainous country. The soil is fruitful in a high degree, and well watered, abounding in creeks and rivulets, whence they are called the *Creek Indians*. The *Seminolas*, a division of the Creek nation, inhabit a level flat country on the Apalachicola and Flint rivers, fertile and well watered. The *Chactaws* or flat-heads inhabit a very fine and extensive tract of hilly country, with large and fertile plains intervening, between the Alabama and Mississippi rivers, in the western part of this state. This nation have 43 towns and villages, in three divisions, containing 12,123 souls, of which 4041 are fighting men. The *Chicasaws* are settled on the head branches of the Tombekbe, Mobile, and Yazoo rivers, in the north-west corner of the state. Their country is an extensive plain, tolerably well watered from springs, and of a pretty good soil. They have 7 towns, the central one of which is in latitude 34° 23', and longitude 14° 30' west. The number of souls in this nation have been reckoned at 1725, of which 575 are fighting men.

That part of Georgia which has been laid out in counties is divided into the following, viz. Chatham, Effingham, Burke, Richmond, Wilkes, Liberty, Glynn, Camden, Washington, Greene, Franklin; and the chief towns are, Savannah, Ebenezer, Waynesborough, and

Louisville,

Georgia. Louisville, Augusta, Washington, Sunbury, Brunswick, St Patrick's, Golphinton, Greensburg.— Savannah was formerly the capital, and is still the largest town (see SAVANNAH). But the present seat of government in this state is *Augusta*, situated on the southwest bank of Savannah river, about 134 miles from the sea, and 117 northwest of Savannah. The town, which contains not far from 200 houses, is on a fine large plain; and as it enjoys the best soil, and the advantage of a central situation between the upper and lower counties, is rising fast into importance. Louisville, however, is designed as the future seat of government in this state. It has lately been laid out on the bank of Ogeechee river, about 70 miles from its mouth, but is not yet built.

Savannah river forms a part of the divisional line which separates this state from South Carolina. It is formed principally of two branches, by the names of *Tugulo* and *Keowee*, which spring from the mountains. Ogeechee river, about 18 miles south of the Savannah, is a smaller river, and nearly parallel with it in its course. Alatomaha, about 60 miles south of Savannah river, is formed by the junction of the Okonee and Okemulgee branches. It is a noble river, but of difficult entrance. Like the Nile, it discharges itself by several mouths into the sea. Besides these, there is Turtle river, Little Sitilla, Great Sitilla, Crooked river, and St Mary's, which form a part of the southern boundary of the United States. The rivers in the middle and western parts of this state are Apalachicola, which is formed by the Chatahouchee and Flint rivers, Mobile, Pascagoula, and Pearl rivers. All these running southwardly, empty into the Gulf of Mexico.

In the grand convention at Philadelphia in 1787, the inhabitants of this state were reckoned at 90,000, including three-fifths of 20,000 negroes. But from the number of the militia, which has been ascertained with a considerable degree of accuracy, there cannot be at most more than half that number. No general character will apply to the inhabitants at large. Collected from different parts of the world, as interest, necessity, or inclination led them, their character and manners must of course partake of all the varieties which distinguish the several states and kingdoms from whence they came. There is so little uniformity, that it is difficult to trace any governing principles among them. An aversion to labour is too predominant, owing in part to the relaxing heat of the climate, and partly to the want of necessity to excite industry. An open and friendly hospitality, particularly to strangers, is an ornamental characteristic of a great part of this people.

In regard to religion, politics, and literature, this state is yet in its infancy. In Savannah is an episcopal church, a presbyterian church, a synagogue, and a German Lutheran church, supplied occasionally by a German minister from Ebenezer, where there is a large convenient stone church, and a settlement of sober industrious Germans of the Lutheran religion. In Augusta they have an episcopal church. In Midway is a society of Christians established on the congregational plan. Their ancestors emigrated in a colony from Dorchester, near Boston, about the year 1700,

and settled at a place named Dorchester, about 20 miles southwest of Charlestown, South Carolina. In 1752, for the sake of a better climate and more land, almost the whole society removed and settled at Midway. They, as a people, retain in a great measure that simplicity of manners, that unaffected piety and brotherly love which characterized their ancestors, the first settlers of New England. The upper counties are supplied pretty generally by baptist and methodist ministers; but the greater part of the state is without ministers of any denomination.

The numerous defects in the late constitution of this state, induced the citizens pretty universally to petition for a revision of it. It was accordingly revised, or rather a new one was formed, in the course of the year 1789, nearly upon the plan of the constitution of the United States, which has lately been adopted by the state.

The charter containing the present system of education in this state was passed in the year 1785. A college, with ample and liberal endowments, is instituted in Louisville, a high and healthy part of the country, near the centre of the state. There is also provision made for the institution of an academy in each county in the state, to be supported from the same funds, and considered as parts and members of the same institution, under the general superintendence and direction of a president and board of trustees, appointed for their literary accomplishments from the different parts of the state, and invested with the customary powers of corporations. The institution thus composed is denominated *the university of Georgia*. The funds for the support of this institution are principally in lands, amounting in the whole to about 50,000 acres, a great part of which is of the best quality, and at present very valuable. There are also nearly L. 6000 sterling in bonds, houses, and town lots in the town of Augusta. Other public property to the amount of L. 1000 in each county has been set apart for the purposes of building and furnishing their respective academies. The funds originally designed for the support of the orphan-house, are chiefly in rice plantations and negroes.

GEORGIC, a poetical composition upon the subject of husbandry, containing rules therein, put into a pleasing dress, and set off with all the beauties and embellishments of poetry. The word is borrowed from the Latin *georgicus*, and that of the Greek γεωργικός, of γη, *terra*, "earth," and εργάζομαι, *opera*, "I work, or labour," of εργον, *opus*, "work." Hesiod and Virgil are the two greatest masters in this kind of poetry. The moderns have produced nothing in this kind, except Rapin's book of Gardening; and the celebrated poem intitled *Cyder*, by Mr Philips, who, if he had enjoyed the advantage of Virgil's language, would have been second to Virgil in a much nearer degree.

GEORGIUM Sidus. See ASTRONOMY, n° 328, &c.

GEPIDÆ, GEPIDES, or GEPIDI (anc. geog.), according to Procopius, were a Gothic people, or a canton or branch of them; some of whom, in the migration of the Goths, settled in an island at the mouth of the Vistula, which they called *Gepidos* after their own name, which denotes lazy or slothful; others in Dacia, calling their settlement there *Gepidia*.

geranites, GERANITES, in natural history, an appellation given to such of the semipellucid gems as are marked with a spot resembling a crane's eye.

GERANIUM, CRANES BILL, in botany: A genus of the decandria order, belonging to the monodelphia class of plants; and in the natural method ranking under the 14th order, *Grinales*. Its characters are these: the flower hath a permanent empalement, composed of five small oval leaves, and five oval or heart-shaped petals, spreading open, which are in some species equal, and in others the upper two are much larger than the three lower. It has ten stamina, alternately longer than each other, but shorter than the petals, and terminated by oblong summits. In the bottom of the flower is situated a five-cornered germen, which is permanent. The flower is succeeded by five seeds, each being wrapped up in the husk of the beak, where they are twisted together at the point, so as to form the resemblance of a stork's beak. There are above 80 species.

The common wild sorts of this plant, and those also which are brought to the curious from the colder climates, are hardy enough, and require little care; but the African species, and the others from hot countries, which make so very beautiful a figure in our green-houses, require great care in their culture and propagation.

These may be propagated by seed, which should be sown toward the end of March in beds of light earth, and carefully shading them from the sun, and giving them frequent, but gentle waterings, till they are well rooted. The mats with which these beds are covered are to be taken off in gentle showers, and always in the hot weather at nights, that the plants may have the benefit of the dew. They should remain about two months in this bed, by which time they will have taken root. Some pots of about seven inches wide are then to be filled with light earth, and the plants are to be carefully taken up with as much as possible of their own earth about them, and planted severally in the middle of these pots; when they are to be set in a shady place, and watered at times till they have taken root. When they are well-rooted, they should be set in a more exposed place to harden them, and should stand out till the middle of October; but when the mornings begin to grow frosty, they must be removed into the green-house, and then placed as near the windows as possible, and the windows should be opened upon them till the weather is very cold. During the winter, they must be frequently watered a little at a time, and their dead leaves should be pulled off. They must not stand under the shade of other plants, nor need any artificial heat.

Those who are desirous that their plants should be large and flower soon, sow the seeds on a moderate hot-bed in the spring; when they are come up, they should not be drawn weak, and the pots into which they are transplanted should be plunged into another moderate hot-bed, shading them from the sun till they have taken root, and gradually inuring them to the open air, into which they should be removed in the beginning of June, and placed in a sheltered situation with other exotic plants.

The shrubby African geraniums are commonly propagated by cuttings, which, planted in a shady bor-

der, in June or July, will take good root in five or six weeks; and they may then be taken up and planted in separate pots, placing them in the shade till they have taken new root; after which they may be removed into a sheltered situation, and treated as the seedling plants.

Geranium stands recommended as one of the greatest vulneraries and abstersgents of the vegetable world, and is highly extolled for its power of stopping profluvia of the menses, and hæmorrhages of all kinds. Experience confirms the truth of this, especially among the poor people in the country; and it were to be wished that the plant could be brought into more esteem in the shops, where at present it is disregarded.

GERAR, or GERARA, (anc. geog.), the south boundary of Canaan near Berséba; situated between Cades and Sur; two desarts well known, the former facing Egypt, the latter Arabia Petræa.

GERARD (John), a learned Lutheran divine, was professor of divinity, and rector of the academy of Jena, the place of his birth. He wrote, 1. The harmony of the eastern languages; 2. A Treatise on the Coptic Church; and other works which are esteemed. He died in 1668.

GERARDE (John), a surgeon in London, and the greatest botanist of his time, was many years chief gardener to Lord Burleigh; who was himself a great lover of plants, and had the best collection of any nobleman in the kingdom, among which were a great number of exotics introduced by Gerarde. In 1597 he published his *Herbal*, which was printed at the expence of J. Norton, who procured the figures from Francfort. In 1663, Thomas Johnson, an apothecary, published an improved edition of Gerarde's book; which met with such approbation by the University of Oxford, that they conferred on him the degree of doctor of physic; and it is still much esteemed. The descriptions in the herbal are plain and familiar; and both these authors have laboured more to make their readers understand the characters of the plants, than to inform them that they themselves understood Greek and Latin.

GERARDIA, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, *Personate*. The calyx is quinquefid, the corolla bilabiate; the under lip tripartite; the side lobes emarginated, and the middle one bipartite; the capsule bilocular and gaping.

GERBIER (Sir Balthazar), a painter of Antwerp, born in the year 1592, distinguished himself by painting small figures in distemper. King Charles I. was so pleased with his performances, that he invited him to his court, where he obtained the esteem of the duke of Buckingham, and grew into great favour. He was not only knighted, but sent to Brussels, where he long resided as agent for the king of Great Britain.

GERFALCON. See FALCO.

GERGESA, (anc. geog.), a Transjordan town, no otherwise known than by the *Gergeseni* of St Matthew, and *Gergesai* of Moses; supposed to have stood in the neighbourhood of Gadara and near the sea of Tiberias. The *Gergesai*, one of the seven ancient people of Canaan, less frequently mentioned than the rest, appear to have been less considerable and more obscure: their name

Gerar
||
Gergesai

Gerizim name is from *Girgass*, one of Canaan's sons. See GIRGASHITES.

Germany.

GERIZIM. See GARIZIM.

GERM, among gardeners. See GERMEN.

GERMAN, in matters of genealogy, signifies whole, entire, or own. *Germani, quasi eadem stirpe genti*; (Fest.) Hence,

Brother-GERMAN, denotes a brother both by the father's and mother's side, in contradistinction to uterine brothers, &c. who are only so by the mother's side.

Cousins-GERMAN, are those in the first or nearest degree, being the children of brothers or sisters.

Among the Romans we have no instance of marriage between cousins-german before the time of the emperor Claudius, when they were very frequent.

Theodosius prohibited them under very severe penalties, even fine and proscription. See CONSANGUINITY.

GERMAN, or *Germanic*, also denotes any thing belonging to Germany; as the German empire, German flute, &c.

GERMANDER, in botany. See the article TENDRUM.

GERMANICUS CÆSAR, the son of Drusus, and paternal nephew to the emperor Tiberius, who adopted him; a renowned general, but still more illustrious for his virtues. He took the title of *Germanicus* from his conquests in that country; and though he had the moderation to refuse the empire offered to him by his army, Tiberius, jealous of his success, and of the universal esteem he acquired, caused him to be poisoned, A. D. 29, aged 34. He was a protector of learning; and composed some Greek comedies and Latin poems, some of which are still extant.

GERMANY, a very extensive empire of Europe, but which, in different ages of the world, has had very different limits. Its name, according to the most probable conjecture, is derived from the Celtic words *Ghar man*, signifying a warlike man, to which their other name, *Allman*, or *Aleman*, likewise alludes.

The ancient history of the Germans is altogether wrapped up in obscurity; nor do we, for many ages, know any thing more of them than what may be learned from the history of their wars with the Romans. The first time we find them mentioned by the Roman historians, is about the year 211 B. C. at which time Marcellus subdued Insubria and Liguria, and defeated the Gætazæ, a German nation situated on the banks of the Rhine. From this time history is silent with regard to any of these northern nations, till the eruption of the Cimbri and Teutones, who inhabited the most northerly parts of Germany. The event of their enterprise is related under the articles AMBRONES, CIMBRI, and TEUTONES. We must not, however, imagine, because these people happened to invade Italy at the same time, that therefore their countries were contiguous to one another. The Cimbri and Teutones only, dwelt beyond the Rhine; while the Ambrones inhabited the country between Switzerland and Provence. It is indeed very difficult to fix the limits of the country called *Germany* by the Romans.

Limits of ancient Germany.

The southern Germans were intermixed with the Gauls, and the northern ones with the Scythians; and thus the ancient history of the Germans includes that of the

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Dacians, Huns, Goths, &c. till the destruction of the western Roman empire by them. Ancient Germany, therefore, we may reckon to have included the northern part of France, the Netherlands, Holland, *Germany* so called at present, Denmark, Prussia, Poland, Hungary, part of Turkey in Europe, and Muscovy.

The Romans divided Germany into two regions; Belgic or Lower Germany, which lay to the southward of the Rhine; and Germany Proper, or High Germany. The first lay between the rivers Seine and the Rhine; and in this we find a number of different nations, the most remarkable of which were the following.

1. The Ubii, whose territory lay between the Rhine and the Mosæ or Maese, and whose capital was the city of Cologne. 2. Next to them were the Tungri, supposed to be the same whom Cæsar calls *Eburones* and *Condrusi*; and whose metropolis, then called *Attuatica*, has since been named *Tongres*. 3. Higher up from them, and on the other side of the Moselle, were the Treviri, whose capital was Augusta Trevirorum, now *Triers*. 4. Next to them were the Tribocci, Nemetes, and Vangiones. The former dwelt in Alsace, and had Argentoratum, now *Strasbourg*, for their capital: the others inhabited the cities of Worms, Spire, and Mentz. 5. The Mediomatrici were situated along the Moselle, about the city of Metz in Lorraine; and above them were situated another German nation, named *Raurici*, *Rauraci*, or *Rauriaci*, and who inhabited that part of Helvetia, or Switzerland, about Basil. To the westward and southward of these were the Nervii, Suevones, Silvanectes, Leuci, Rhemi, Lingones, &c. who inhabited Belgic Gaul.

Between the heads of the Rhine and Danube were seated the ancient kingdom of Vindelicia, whose capital was called *Augusta Vindelicorum*, now *Augsburg*. Below it on the banks of the Danube were the kingdoms of Noricum and Pannonia. The first of these was divided into Noricum *Ripense* and *Mediterraneum*. It contained a great part of the provinces of Austria, Styria, Carinthia, Tyrol, Bavaria, and some others of less note. The latter contained the kingdom of Hungary, divided into Upper and Lower; and extending from Illyricum to the Danube, and the mountains Cætii in the neighbourhood of *Vindebona*, now *Vienna*.

Upper or High Germany lay beyond the Rhine and the Danube. Between the Rhine and the Elbe were the following nations. 1. The Chauci, Upper and Lower; who were divided from each other by the river Visurges, now the *Wefer*. Their country contained what is now called *Bremen*, *Lunenbourg*, *Friesland*, and *Groninghen*. The upper Chauci had the Cherusci, and the lower the Chamavi on the south-east, and the German Ocean on the north-west. 2. The Frisii, upper and lower, were divided from the lower Chauci by the river Amisia, now the Ems; and from one another by an arm of the Rhine. Their country still retains the name of *Friesland*, and is divided into east and west; but the latter is now dismembered from Germany, and become one of the Seven United Provinces. 3. Beyond the Isela, now the *Isel*, which bounded the country of the Frisii, were situated the Bructeri, who inhabited that tract now called *Broecmorland*; and the

Marsi,

many. Marfi, about the river Luppe. On the other side of that river were the *Ufipii* or *Ufipites*; but these were famed for often changing their territories, and therefore found in other places. 4. Next to these were the *Juones*, or inhabitants of *Juliers*, between the *Maefe* and the *Rhine*. 5. The *Catti*, another ancient and warlike nation, inhabited *Hesse* and *Thuringia*, from the *Hartzian* mountains to the *Rhine* and *Wefer*; among whom were comprehended the *Mattiaci*, whose capital is by some thought to be *Marpurg*, by others *Baden*. 6. Next to these were the *Seducii* bordering upon *Suabia*; *Narifci*, or the ancient inhabitants of *Northgow*, whose capital was *Nuremberg*; and the *Marcomanni*, whose country anciently reached from the *Rhine* to the head of the *Danube*, and to the *Neckar*. The *Marcomanni* afterwards went and settled in *Bohemia* and *Moravia*, under their general or king *Maroboduus*; and some of them in *Gaul*, whence they drove the *Boii*, who had seated themselves there. 7. On the other side of the *Danube*, and between the *Rhine* and it, were the *Hermunduri*, who possessed the country now called *Mifnia* in *Upper Saxony*; though some make their territories to have extended much farther, and to have reached quite to, or even beyond, the kingdom of *Bohemia*, once the seat of the *Boii*, whence its name. 8. Beyond them, on the north of the *Danube*, was another seat of the *Marcomanni* along the river *Albis*, or *Elbe*. 9. Next to *Bohemia* were situated the *Quadi*, whose territories extended from the *Danube* to *Moravia*, and the northern part of *Austria*. These are comprehended under the ancient name of *Suevi*; part of whom at length forced their way into *Spain*, and settled a kingdom there. 10. Eastward of the *Quadi* were situated the *Bastarnæ*, and parted from them by the *Granna*, now *Gran*; a river that falls into the *Danube*, and by the *Carpathian* mountains, from them called *Alpes Bastarnicæ*. The country of the *Bastarnæ* indeed made part of the *European Sarmatia*, and so was without the limits of *Germany* properly so called; but we find these people so often in league with the *German* nations, and joining them for the destruction of the *Romans*, that we cannot but account them as one people.

Between those nations already taken notice of, seated along the other side of the *Danube* and the *Hercynian* forest, were several others whose exact situation is uncertain, viz. the *Martingi*, *Burii*, *Borades*, *Lygii*, or *Logiones*, and some others, who are placed by our geographers along the forest above-mentioned, between the *Danube* and the *Vistula*.

On this side the *Hercynian* forest, were the famed *Rhætii*, now *Grisons*, seated among the *Alps*. Their country, which was also called *Western Illyricum*, was divided into *Rhætia Prima* or *Propria*, and *Secunda*; and was then of much larger extent, spreading itself towards *Suabia*, *Bavaria*, and *Austria*.

On the other side of the *Hercynian* forest, were, 1. The *Suevi*, who spread themselves from the *Vistula* to the river *Elbe*. 2. The *Longobardi*, so called, according to some, on account of their wearing long beards; but, according to others, on account of their consisting of two nations, viz. the *Bardi* and *Lingones*. These dwelt along the river *Elbe*, and bordered southward on the *Chauci* above mentioned. 3. The *Burgundi*, of whose original seat we are uncertain. 4. The

Semnonæ; who, about the time of *Tiberius*, were seated on the river *Elbe*. 5. The *Angles*, *Saxons*, and *Goths*; were probably the descendants of the *Cimbri*; and inhabited the countries of *Denmark*, along the *Baltic* sea, and the peninsula of *Scandinavia*, containing *Norway*, *Sweden*, *Lapland*, and *Finmark*. 6. The *Vandals* were a *Gothic* nation, who, proceeding from *Scandinavia*, settled in the countries now called *Mecklenburgh* and *Brandenburgh*. 7. Of the same race were the *Dacians*, who settled themselves in the neighbourhood of *Palus Mæotis*, and extended their territories along the banks of the *Danube*.

These were the names of the *German* nations who performed the most remarkable exploits in their wars with the *Romans*. Besides these, however, we find mention made of the *Scordisci*, a *Thracian* nation, who afterwards settled on the banks of the *Danube*. About the year 113 B. C. they ravaged *Macedon*, and cut off a whole *Roman* army sent against them; the general, *M. Porcius Cato*, grandson to *Cato* the censor, being the only person who had the good fortune to make his escape. After this, they ravaged all *Thessaly*; and advanced to the coasts of the *Adriatic*, into which, because it stopped their farther progress, they discharged a shower of darts. By another *Roman* general, however, they were driven back into their own country with great slaughter; and, soon after, *Metellus* so weakened them by repeated defeats, that they were incapable, for some time, of making any more attempts on the *Roman* provinces. At last, in the consulship of *M. Livius Drusus* and *L. Calpurnius Piso*, the former prevailed on them to pass the *Danube*, which thenceforth became the boundary between the *Romans* and them. Notwithstanding this, in the time of the *Jugurthine* war, the *Scordisci* repassed the *Danube* on the ice every winter, and being joined by the *Triballi* a people of *Lower Mæsia*, and the *Daci* of *Upper Mæsia*, penetrated as far as *Macedon*, committing every where dreadful ravages. So early did these northern nations begin to be formidable to the *Romans*, even when they were most renowned for warlike exploits.

Till the time of *Julius Cæsar*, however, we hear nothing more concerning the *Germans*. About 58 years B. C. he undertook his expedition into *Gaul*; during which, his assistance was implored by the *Ædui*, against *Ariovistus*, a *German* prince who oppressed them. *Cæsar*, pleased with this opportunity of increasing his power, invited *Ariovistus* to an interview; but this being declined, he next sent deputies desiring him to restore the hostages he had taken from the *Ædui*, and to bring no more troops over the *Rhine* into *Gaul*. To this a haughty answer was returned; and a battle soon after ensued, in which *Ariovistus* was entirely defeated, and with great difficulty made his escape.

In 55 B. C. *Cæsar* having subdued the *Suessones*, *Bellovaci*, *Ambiani*, *Nervii*, and other nations of *Belgic Gaul*, hastened to oppose the *Ufipetes* and *Tencteri*. These nations having been driven out of their own country by the *Suevi*, had crossed the *Rhine* with a design to settle in *Gaul*. As soon as he appeared, the *Germans* sent him a deputation, offering to join him provided he would assign them lands. *Cæsar* replied, that there was no room in *Gaul* for them; but

Germany. he would desire the Ubii to give them leave to settle among them. Upon this, they desired time to treat with the Ubii; but in the mean time fell upon some Roman squadrons: which so provoked Cæsar, that he immediately marched against them, and, coming unexpectedly upon them, defeated them with great slaughter. They fled in the utmost confusion; but the Romans pursued them to the conflux of the Rhine and the Maese, where the slaughter was renewed with such fury, that almost 400,000 of the Germans perished. After this, Cæsar being resolved to spread the terror of the Roman name through Germany, built a bridge over the Rhine, and entered that country. In this expedition, however, which was his last in Germany, he performed no remarkable exploit. A little before his death, indeed, he had projected the conquest of that as well as of a great many other countries; but his assassination prevented the execution of his designs. Nor is there any thing recorded of the Germans till about 17 B. C. when the Tencteri made an irruption into Gaul, and defeated M. Lollius, proconsul of that province. At last, however, they were repulsed, and forced to retire with great loss beyond the Rhine.

6
Rhæti invade Italy.

Soon after this the Rhæti invaded Italy, where they committed the greatest devastations, putting all the males they met to the sword, without distinction of sex or age: nay, we are told, that when they happened to take women with child, they consulted their augurs to know whether the child was a male or female; and if they pronounced it a male, the mother was immediately massacred. Against these barbarians was sent Drusus, the second son of Livia, a youth of extraordinary valour and great accomplishments. He found means to bring them to a battle; in which the Romans proved victorious, and cut in pieces great numbers of their enemies, with very little loss on their own side. Those who escaped the general slaughter, being joined by the Vindelici, took their rout towards Gaul, with a design to invade that province. But Augustus, upon the first notice of their march, dispatched against them Tiberius with several chosen legions. He was no less successful than Drusus had been; for, having transported his troops over the lake Brigantium, now Constance, he fell unexpectedly on the enemy, gave them a total overthrow, took most of their strong holds, and obliged the whole nation to submit to such terms as he chose to impose upon them. Thus were the Vindelici, the Rhæti, and Norici, three of the most barbarous nations in Germany, subdued. Tiberius, to keep the conquered countries in awe, planted two colonies in Vindelicia, and opened from thence a road into Rhætia and Noricum. One of the cities which he built for the defence of his colonies, he called, from his father Drusus, *Drusomagus*; the other by the name of Augustus, *Augusta Vindelicorum*; which cities are now known by the names of *Mimminghen* and *Augsburg*. He next encountered the Pannonians, who had been subdued by Agrippa, but revolted on hearing the news of that great commander's death, which happened 11 years B. C. Tiberius, however, with the assistance of their neighbours the Scordisci, soon forced them to submit. They delivered up their arms, gave hostages, and put the Romans in possession of all their towns and strong-holds. Tiberius spared

7
They are subdued, together with the Vindelici and Norici.

8
And the Pannonians.

their lives; but laid waste their fields, plundered their cities, and sent the best part of their youth into other countries.

In the mean time, Drusus having prevented the Gauls from revolting, which they were ready to do, prepared to oppose the Germans who dwelt beyond the Rhine. They had collected the most numerous and formidable army that had ever been seen in those parts; with which they were advancing towards the Rhine, in order to invade Gaul. Drusus defeated them as they attempted to cross that river; and, pursuing the advantage he had gained, entered the country of the Usipetes, now *Relinchusen*, and from thence advanced against the Sicambri, in the neighbourhood of the Lyppe and Issel. Them he overthrew in a great battle, laid waste their country, burnt most of their cities, and following the course of the Rhine, approached the German ocean, reducing the Frisii and the Chauci between the Ems and the Elbe. In these marches the troops suffered extremely for want of provisions; and Drusus himself was often in great danger of being drowned, as the Romans who attended him were at that time quite unacquainted with the flux and reflux of the ocean.

The Roman forces went into east Friesland for their winter-quarters; and next year (10 B. C.) Drusus marched against the Tencteri, whom he easily subdued. Afterwards, passing the Lupias, now the Lyppe, he reduced the Catti and Cherusci, extending his conquests to the banks of the Visurgis or Weser: which he would have passed, had he not been in want of provisions, the enemy having laid waste the country to a considerable distance. As he was retiring, the Germans unexpectedly fell upon him in a narrow passage; and having surrounded the Roman army, cut a great many of them in pieces. But Drusus having animated his men by his example, after a bloody conflict, which lasted the whole day, the Germans were defeated with such slaughter, that the ground was strewed for several miles with dead bodies. Drusus found in their camp a great quantity of iron-chains which they had brought for the Romans; and so great was their confidence, that they had agreed before-hand about the division of the booty. The Tencteri were to have the horse, the Cherusci and Sicambri the baggage, and the Usipetes and Catti the captives. After this victory, Drusus built two forts to keep the conquered countries in awe; the one at the confluence of the Lyppe and the Alme, the other in the country of the Catti on the Rhine. On this occasion also he made a famous canal, long after called in honour of him *Fossa Drusiana*, to convey the waters of the Rhine into the Sala or Sale. It extended eight miles; and was very convenient for conveying the Roman troops by water to the countries of the Frisii and Chauci, which was the design of the undertaking.

The following year (9 B. C.), Augustus, bent on subduing the whole of Germany, advanced to the banks of the Rhine, attended by his two sons-in-law Tiberius and Drusus. The former he sent against the Daci, who lived up to the south of the Danube; and the latter to complete the conquests he had so successfully begun in the western parts of Germany. The former easily overcame the Daci, and transplanted 40,000 of them into Gaul. The latter, having passed the

the Rhine, subdued all the nations from that river to the Elbe; but having attempted in vain to cross this last, he set out for Rome: an end, however, was put to his conquests and his life by a violent fever, with which he was seized on his return.

After the death of Drusus, Tiberius again over-ran all those countries in which Drusus had spent the preceding summer; and struck some of the northern nations with such terror, that they sent deputies to sue for peace. This, however, they could not obtain upon any terms; the emperor declaring that he would not conclude a peace with one, unless they all desired it. But the Catti, or according to some the Sicambri, could not by any means be prevailed upon to submit; so that the war was still carried on, though in a languid manner, for about 18 years. During this period, some of the German nations had quitted their forests, and begun to live in a civilized manner under the protection of the Romans; but one Quintilius Varus being sent to command the Roman forces in that country, so provoked the inhabitants by his extortions, that not only those who still held out refused to submit, but even the nations that had submitted were seized with an eager desire of throwing off the yoke. Among them was a young nobleman of extraordinary parts and valour, named *Arminius*. He was the son of *Sigimer*, one of the most powerful lords among the Catti, had served with great reputation in the Roman armies, and been honoured by Augustus with the privileges of a Roman citizen and the title of knight. But the love of his country prevailing over his gratitude, he resolved to improve the general discontent which reigned among his countrymen, to deliver them from the bondage of a foreign dominion. With this view he engaged, underhand, the leading men of all the nations between the Rhine and the Elbe, in a conspiracy against the Romans. In order to put Varus off his guard, he at the same time advised him to show himself to the inhabitants of the more distant provinces, administer justice among them, and accustom them, by his example, to live after the Roman manner, which he said would more effectually subdue them than the Roman sword. As Varus was a man of a peaceable temper, and averse from military toils, he readily consented to this insidious proposal; and, leaving the neighbourhood of the Rhine, marched into the country of the *Cherusci*. Having there spent some time in hearing causes and deciding civil controversies, *Arminius* persuaded him to weaken his army, by sending out detachments to clear the country of robbers. When this was done, some distant nations of Germany rose up in arms by *Arminius's* directions; while those through which Varus was to pass in marching against them, pretended to be in a state of profound tranquillity, and ready to join the Romans against their enemies.

On the first news of the revolt, Varus marched against the enemy with three legions and six cohorts; but being attacked by the Germans as he passed thro' a wood, his army was almost totally cut off, while he himself and most of his officers fell by their own hands. Such a terrible overthrow, though it raised a general consternation in Rome, did not, however, dishearten Augustus, or cause him to abandon his enterprise. About two years after (A. D. 12.), Tiberius and Ger-

manicus were appointed to command in Germany. The death of Augustus, however, which happened soon after, prevented Tiberius from going on his expedition; and Germanicus was for some time hindered from proceeding in his, by a revolt of the legions, first in Pannonia, and then in Germany. About the year 15, Germanicus having brought over the soldiers to their duty, laid a bridge across the Rhine, over which he marched 12,000 legionaries, 26 cohorts of the allies, and eight *alæ* (squadrons of 300 each) of horse. With these he first traversed the *Cælian* forest (part of the *Hercynian*, and thought to lie partly in the duchy of *Cleves*, and partly in *Westphalia*), and some other woods. On his march he was informed that the *Marfi* were celebrating a festival with great mirth and jollity. Upon this he advanced with such expedition, that he surprised them in the midst of their debauch; and giving his army full liberty to make what havoc they pleased, a terrible massacre ensued, and the country was destroyed with fire and sword for 50 miles round, without the loss of a single man on the part of the Romans.—This general massacre roused the *Bructeri*, the *Tubantes*, and the *Usipetes*; who, besetting the passes through which the Roman army was to return, fell upon their rear, and put them into some disorder; but the Romans soon recovered themselves, and defeated the Germans with considerable loss.

The following year (A. D. 16), Germanicus taking advantage of some intestine broils which happened among the Catti, entered their country, where he put great numbers to the sword. Most of their youth, however, escaped by swimming over the *Adrana*, now the *Eder*, and attempted to prevent the Romans from laying a bridge over that river: but being disappointed in this, some of them submitted to Germanicus, while the greater part, abandoning their villages, took refuge in the woods; so that the Romans, without opposition, set fire to all their villages, towns, &c. and having laid their capital in ashes, began their march back to the Rhine.

Germanicus had scarce reached his camp, when he received a message from *Segestes*, a German prince, in the interest of the Romans, acquainting him that he was besieged in his camp by *Arminius*. On this advice, he instantly marched against the besiegers; entirely defeated them; and took a great number of prisoners, among whom was *Thufeldis*, the wife of *Arminius*, and daughter of *Segestes*, whom the former had carried off, and married against her father's will. *Arminius* then, more enraged than ever, for the loss of his wife, whom he tenderly loved, stirred up all the neighbouring nations against the Romans. Germanicus, however, without being dismayed by such a formidable confederacy, prepared himself to oppose the enemy with vigour: but, that he might not be obliged to engage such numerous forces at once, he detached his lieutenant *Cæcina*, at the head of 40 cohorts, into the territories of the *Bructeri*; while his cavalry, under the command of *Pedo*, entered the country of the *Frisii*. As for Germanicus himself, he embarked the remainder of his army, consisting of four legions, on a neighbouring lake; and transported them by rivers and canals to the place appointed on the river *Ems*, where the three bodies met. In their

Germany.

march they found the sad remains of the legions conducted by Varus, which they buried with all the ceremony their circumstances could admit. After this they advanced against Arminius, who retired and posted himself advantageously close to a wood. The Roman general followed him; and coming up with him, ordered his cavalry to advance and attack the enemy. Arminius, at their first approach, pretended to fly; but suddenly wheeled about, and giving the signal to a body of troops, whom he had concealed in the wood, to rush out, obliged the cavalry to give ground. The cohorts then advanced to their relief; but they too were put into disorder, and would have been pushed into a morass, had not Germanicus himself advanced with the rest of the cavalry to their relief. Arminius did not think it prudent to engage these fresh troops, but retired in good order; upon which Germanicus also retired towards the Ems. Here he embarked with four legions, ordered Cæcina to reconduct the other four by land, and sent the cavalry to the sea-side, with orders to march along the shore to the Rhine. Tho' Cæcina was to return by roads well known, yet Germanicus advised him to pass, with all possible speed, a causeway, called the *long bridges*, which led across vast marshes, surrounded on all sides with woods and hills that gently rose from the plain.

Arminius, however, having got notice of Cæcina's march, arrived at the long bridges before Cæcina, and filled the woods with his men, who, on the approach of the Romans, rushed out, and attacked them with great fury. The legions, not able to manage their arms in the deep waters and slippery ground, were obliged to yield; and would in all probability have been entirely defeated, had not night put an end to the combat. The Germans, encouraged by their success, instead of refreshing themselves with sleep, spent the whole night in diverting the courses of the springs which rose in the neighbouring mountains; so that, before day, the camp which the Romans had begun was laid under water, and their works were overturned. Cæcina was for some time at a loss what to do; but at last resolved to attack the enemy by day-break, and, having driven them to their woods, to keep them there in a manner besieged, till the baggage and wounded men should pass the causeway, and get out of the enemy's reach. But when his army was drawn up, the legions posted on the wings, seized with a sudden panic, deserted their stations, and occupied a field beyond the marshes. Cæcina thought it advisable to follow them; but the baggage stuck in the mire, as he attempted to cross the marshes, which greatly embarrassed the soldiers. Arminius perceiving this, laid hold of the opportunity to begin the attack; and crying out, "This is a second Varus, the same fate attends him and his legions," fell on the Romans with inexpressible fury. As he had ordered his men to aim chiefly at the horses, great numbers of them were killed; and the ground becoming slippery with their blood and the slime of the marsh, the rest either fell or threw their riders, and, galloping through the ranks, put them in disorder. Cæcina distinguished himself in a very eminent manner; but his horse being killed, he would have been taken prisoner, had not the first legion rescued him. The greediness of the enemy, however, saved the Romans from utter destruction;

for just as the legions were quite spent, and on the point of yielding, the barbarians on a sudden abandoned them in order to seize their baggage. During this respite, the Romans struggled out of the marsh, and having gained the dry fields, formed a camp with all possible speed, and fortified it in the best manner they could.

The Germans having lost the opportunity of destroying the Romans, contrary to the advice of Arminius, attacked their camp next morning; but were repulsed with great slaughter; after which they gave Cæcina no more molestation till he reached the banks of the Rhine. Germanicus, in the mean time, having conveyed the legions he had with him down the river Ems into the ocean, in order to return by sea to the river Rhine, and finding that his vessels were overloaded, delivered the second and 14th legions to Publius Vitellius, desiring him to conduct them by land. But this march proved fatal to great numbers of them; who were either buried in the quicksands, or swallowed up by the overflowing of the tide, to which they were as yet utter strangers. Those who escaped, lost their arms, utensils, and provisions; and passed a melancholy night upon an eminence, which they had gained by wading up to the chin. The next morning the land returned with the tide of ebb; when Vitellius, by an hasty march, reached the river Ulingis, by some thought to be the Hoerenster, on which the city of Groningen stands. There Germanicus, who had reached that river with his fleet, took the legions again on board, and conveyed them to the mouth of the Rhine, whence they all returned to Cologne, at a time when it was reported they were totally lost.

This expedition, however, cost the Romans very dear, and procured very few advantages. Great numbers of men had perished; and by far the greatest part of those who had escaped so many dangers returned without arms, utensils, horses, &c. half naked, lamed, and unfit for service. The next year, however, Germanicus, bent on the entire reduction of Germany, made vast preparations for another expedition. Having considered the various accidents that had befallen him during the war, he found that the Germans were chiefly indebted for their safety to their woods and marshes, their short summers and long winters; and that his troops suffered more from their long and tedious marches than from the enemy. For this reason, he resolved to enter the country by sea, hoping by that means to begin the campaign earlier, and surprise the enemy. Having therefore built with great dispatch, during the winter, 1000 vessels of different sorts, he ordered them early in the spring (A. D. 16) to fall down the Rhine, and appointed the island of the Batavians for the general rendezvous of his forces. When the fleet was sailing, he detached Silius one of his lieutenants, with orders to make a sudden irruption into the country of the Catti; and, in the meantime, he himself, upon receiving intelligence that a Roman fort on the Luppias was besieged, hastened with six legions to its relief. Silius was prevented, by sudden rains, from doing more than taking some small booty, with the wife and daughter of Arpen king of the Catti; neither did those who besieged the fort wait the arrival of Germanicus. In the mean time, the fleet arriving at the island of the Batavians, the pro-

Germany. provisions and warlike engines were put on board and sent forward; ships were assigned to the legions and allies; and the whole army being embarked, the fleet entered the canal formerly cut by Drusus, and from his name called *Fossa Drusiana*. Hence he sailed prosperously to the mouth of the Ems; where, having landed his troops, he marched directly to the Weser, where he found Arminius encamped on the opposite bank, and determined to dispute his passage. The next day Arminius drew out his troops in order of battle: but Germanicus, not thinking it advisable to attack them, ordered the horse to ford over under the command of his lieutenants Stertinius and Emilius; who, to divide the enemy's forces, crossed the river in two different places. At the same time Cariovalda, the leader of the Batavian auxiliaries, crossed the river where it was most rapid: but, being drawn into an ambuscade, he was killed, together with most of the Batavian nobility; and the rest would have been totally cut off, had not Stertinius and Emilius hastened to their assistance. Germanicus in the mean time passed the river without molestation. A battle soon after ensued; in which the Germans were defeated with so great a slaughter that the ground was covered with arms and dead bodies for more than 10 miles round: and among the spoils taken on this occasion, were found, as formerly, the chains with which the Germans had hoped to bind their captives.

In memory of this signal victory Germanicus raised a mount, upon which he placed as trophies the arms of the enemy, and inscribed underneath the names of the conquered nations. This so provoked the Germans, though already vanquished and determined to abandon their country, that they attacked the Roman army unexpectedly on its march, and put them into some disorder. Being repulsed, they encamped between a river and a large forest surrounded by a marsh except on one side, where it was inclosed by a broad rampart formerly raised by the Angrivarii as a barrier between them and the Cherusci. Here another battle ensued; in which the Germans behaved with great bravery, but in the end were defeated with great slaughter.

After this second defeat, the Angrivarii submitted, and were taken under the protection of the Romans, and Germanicus put an end to the campaign. Some of the legions he sent to their winter-quarters by land, while he himself embarked with the rest on the river Ems, in order to return by sea. The ocean proved at first very calm, and the wind favourable: but all of a sudden a storm arising, the fleet, consisting of 1000 vessels, was dispersed: some of them were swallowed up by the waves; others were dashed in pieces against the rocks, or driven upon remote and inhospitable islands, where the men either perished by famine, or lived upon the flesh of the dead horses with which the shores soon appeared strewed; for, in order to lighten their vessels, and disengage them from the shoals, they had been obliged to throw overboard their horses and beasts of burden, nay, even their arms and baggage. Most of the men, however, were saved, and even great part of the fleet recovered. Some of them were driven upon the coast of Britain; but the petty kings who reigned there generously sent them back.

On the news of this misfortune, the Catti, taking new courage, ran to arms; but Caius Silius being de-

tached against them with 30,000 foot and 3000 horse, Germany. kept them in awe. Germanicus himself, at the head of a numerous body, made a sudden irruption into the territories of the Marfi, where he recovered one of Varus's eagles, and having laid waste the country, he returned to the frontiers of Germany, and put his troops into winter-quarters; whence he was soon recalled by Tiberius, and never suffered to return into Germany again.

After the departure of Germanicus, the more northern nations of Germany were no more molested by the Romans. Arminius carried on a long and successful war with Maroboduus king of the Marcomanni, whom he at last expelled, and forced to apply to the Romans for assistance; but, excepting Germanicus, it seems they had at this time no other general capable of opposing Arminius, so that Maroboduus was never restored. After the final departure of the Romans, however, Arminius having attempted to enslave his country, fell by the treachery of his own kindred. The Germans held his memory in great veneration; and Tacitus informs us, that in his time they still celebrated him in their songs.

Nothing remarkable occurs in the history of Germany from this time till the reign of the emperor Claudius. A war indeed is said to have been carried on by Lucius Domitius, father to the emperor Nero. But of his exploits we know nothing more than that he penetrated beyond the river Elbe, and led his army farther into the country than any of the Romans had ever done. In the reign of Claudius, however, the German territories were invaded by Cn. Domitius Corbulo, one of the greatest generals of his age. But when he was on the point of forcing them to submit to the Roman yoke, he was recalled by Claudius, who was jealous of the reputation he had acquired.

In the reign of Vespasian, a terrible revolt happened among the Batavians and those German nations who had submitted to the Romans; a particular account of which is given under the article *ROME*. The revolters were with difficulty subdued; but, in the reign of The Dacians invaded the empire, and proved a more terrible enemy than any of the other German nations had been. After several defeats, the emperor was at last obliged to consent to pay an annual tribute to Decebalus king of the Dacians; which continued to the time of Trajan. But this warlike prince refused to pay tribute; alleging, when it was demanded of him, that "he had never been conquered by Decebalus." Upon this the Dacians passed the Danube, and began to commit hostilities in the Roman territories. Trajan, glad of this opportunity to humble an enemy whom he began to fear, drew together a mighty army, and marched with the utmost expedition to the banks of the Danube. As Decebalus was not apprised of his arrival, the emperor passed the river without opposition, and entering Dacia, laid waste the country with fire and sword. At last he was met by Decebalus with a numerous army. A bloody engagement ensued, in which the Dacians were defeated; though the victory cost the Romans dear: the wounded were so numerous, that they wanted linen to bind up their wounds; and to supply the defect, the emperor generously devoted his own wardrobe. After the victory, he pursued Decebalus from place

15
Death of
Arminius.

16
The Dacians invaded
the Roman
empire.

14
His fleet
dispersed by
a storm.

^{Germany.} plate to place, and at last obliged him to consent to a peace on the following terms: 1. That he should surrender the territories which he had unjustly taken from the neighbouring nations. 2. That he should deliver up his arms, his warlike engines, with the artificers who made them, and all the Roman deserters. 3. That for the future he should entertain no deserters, nor take into his service the natives of any country subject to Rome. 4. That he should dismantle all his fortresses, castles, and strong-holds. And, lastly, that he should have the same friends and foes with the people of Rome.

With these hard terms Decebalus was obliged to comply, though sore against his will; and being introduced to Trajan, threw himself on the ground before him, acknowledging himself his vassal: after which the latter, having commanded him to send deputies to the senate for the ratification of the peace, returned to Rome.

This peace was of no long duration. Four years after (A. D. 105), Decebalus, unable to live in servitude as he called it, began, contrary to the late treaty, to raise men, provide arms, entertain deserters, fortify his castles, and invite the neighbouring nations to join him against the Romans as a common enemy. The Scythians hearkened to his solicitations; but the Jazyges, a neighbouring nation, refusing to bear arms against Rome, Decebalus invaded their country. Hereupon Trajan marched against him; but the Dacian, finding himself unable to withstand him by open force, had recourse to treachery, and attempted to get the emperor murdered. His design, however, proved abortive, and Trajan pursued his march into Dacia. That his troops might the more readily pass and repass the Danube, he built a bridge over that river; which by the ancients is styled the most magnificent and wonderful of all his works*. To guard the bridge, he ordered two castles to be built; one on this side the Danube, and the other on the opposite side; and all this was accomplished in the space of one summer. Trajan, however, as the season was now far advanced, did not think it advisable to enter Dacia this year, but contented himself with making the necessary preparations.

* See Architecture, n° 139.

¹⁷ They are subdued by Trajan.

In the year 106, early in the spring, Trajan set out for Dacia; and having passed the Danube on the bridge he had built, reduced the whole country, and would have taken Decebalus himself had he not put an end to his own life, in order to avoid falling into the hands of his enemies. After his death the kingdom of Dacia was reduced to a Roman province; and several castles were built in it, and garrisons placed in them, to keep the country in awe.

¹⁸ Marcomanni and Quadi formidable to the empire. After the death of Trajan, the Roman empire began to decline, and the northern nations to be daily more and more formidable. The province of Dacia indeed was held by the Romans till the reign of Gallienus; but Adrian, who succeeded Trajan, caused the arches of the bridge over the Danube to be broken down, lest the barbarians should make themselves masters of it, and invade the Roman territories. In the time of Marcus Aurelius, the Marcomanni and Quadi invaded the empire, and gave the emperor a terrible overthrow. He continued the war, however, with better success afterwards, and invaded their country in

his turn. It was during the course of this war that the Roman army is said to have been saved from destruction by that miraculous event related under the article CHRISTIANS, p. 717. col. 2.

In the end, the Marcomanni and Quadi were, by repeated defeats, brought to the verge of destruction; inasmuch that their country would probably have been reduced to a Roman province, had not Marcus Aurelius been diverted from pursuing his conquests by the revolt of one of his generals. After the death of Marcus Aurelius, the Germanic nations became every day more and more formidable to the Romans. Far from being able to invade and attempt the conquest of these northern countries, the Romans had the greatest difficulty to repress the incursions of their inhabitants. But for a particular account of their various invasions of the Roman empire, and its total destruction by them at last, see the article ROME.

The immediate destroyers of the Roman empire were the Heruli; who, under their leader Odoacer, dethroned Augustulus the last Roman emperor, and proclaimed Odoacer king of Italy. The Heruli were soon expelled by the Ostrogoths; and these in their turn were subdued by Justinian, who re-annexed Italy to the eastern empire. But the popes found means to obtain the temporal as well as spiritual jurisdiction over a considerable part of the country, while the Lombards subdued the rest. These last proved very troublesome to the popes, and at length besieged Adrian I. in his capital. In this distress he applied to Charles the Great king of France; who conquered both Italy and Germany, and was crowned emperor of the west in 800.

¹⁹ Roman empire destroyed by the Heruli. The posterity of Charlemagne inherited the empire of Germany until the year 880; at which time the different princes assumed their original independence, rejected the Carolinian line, and placed Arnulph king of Bohemia on the throne. Since this time, Germany has ever been considered as an elective monarchy. Princes of different families, according to the prevalence of their interest and arms, have mounted the throne. Of these the most considerable, until the Austrian line acquired the imperial power, were the houses of Saxony, Franconia, and Swabia. The reigns of these emperors contain nothing more remarkable than the contests between them and the popes; for an account of which, see the article ITALY. From hence, in the beginning of the 13th century, arose the factions of the Guelphs and Gibelines, of which the former was attached to the popes, and the latter to the emperor; and both, by their virulence and inveteracy, tended to disquiet the empire for several ages. The emperors too were often at war with the infidels; and sometimes, as happens in all elective kingdoms, with one another, about the succession.

But what more deserves our attention is the progress of government in Germany, which was in some measure opposite to that of the other kingdoms of Europe. When the empire raised by Charlemagne fell asunder, all the different independent princes assumed the right of election; and those now distinguished by the name of *electors* had no peculiar or legal influence in appointing a successor to the imperial throne; they were only the officers of the king's household, his secretary, his steward, chaplain, marshal, or master of his horse,

²⁰ History of Germany since the time of Charlemagne.

Germany. horse, &c. By degrees, however, as they lived near the king's person, and had, like all other princes, independent territories belonging to them, they increased their influence and authority; and in the reign of Otho III. 984, acquired the sole right of electing the emperor. Thus, while in the other kingdoms of Europe, the dignity of the great lords, who were all originally allodial or independent barons, was diminished by the power of the king, as in France, and by the influence of the people, as in Great Britain; in Germany, on the other hand, the power of the electors was raised upon the ruins of the emperor's supremacy, and of the people's jurisdiction. In 1440, Frederic III. duke of Austria was elected emperor, and the imperial dignity continued in the male line of that family for 300 years. His successor Maximilian married the heiress of Charles duke of Burgundy; whereby Burgundy and the 17 provinces of the Netherlands were annexed to the house of Austria. Charles V. grandson of Maximilian, and heir to the kingdom of Spain, was elected emperor in the year 1519. Under him MEXICO and PERU were conquered by the Spaniards; and in his reign happened the REFORMATION in several parts of Germany; which, however, was not confirmed by public authority till the year 1648, by the treaty of Westphalia, and in the reign of Ferdinand III. The reign of Charles V. was continually disturbed by his wars with the German princes and the French king Francis I. Though successful in the beginning of his reign, his good fortune towards the conclusion of it began to forsake him; which, with other reasons, occasioned his abdication of the crown. See CHARLES V.

His brother Ferdinand I. who in 1558 succeeded to the throne, proved a moderate prince with regard to religion. He had the address to get his son Maximilian declared king of the Romans in his own lifetime, and died in 1564. By his last will he ordered, that if either his own male issue, or that of his brother Charles, should fail, his Austrian estates should revert to his second daughter Anne, wife to the elector of Bavaria, and her issue. We mention this destination, as it gave rise to the late opposition made by the house of Bavaria to the pragmatic sanction, in favour of the empress queen of Hungary, on the death of her father Charles VI. The reign of Maximilian II. was disturbed with internal commotions, and an invasion from the Turks; but he died in peace in 1576. He was succeeded by his son Rodolph; who was involved in wars with the Hungarians, and in differences with his brother Matthias, to whom he ceded Hungary and Austria in his lifetime. He was succeeded in the empire by Matthias; under whom the reformers, who went under the names of *Lutherans* and *Calvinists*, were so much divided among themselves, as to threaten the empire with a civil war. The ambition of Matthias at last tended to reconcile them; but the Bohemians revolted, and threw the imperial commissaries out of a window at Prague. This gave rise to a ruinous war, which lasted 30 years. Matthias thought to have exterminated both parties; but they formed a confederacy, called the *Evangelic League*, which was counterbalanced by a Catholic league.

Matthias dying in 1618, was succeeded by his son Ferdinand II.; but the Bohemians offered their

Germany. crown to Frederic the elector Palatine, the most powerful Protestant prince in Germany, and son-in-law to his Britannic majesty James I. That prince was incautious enough to accept of the crown: but he lost it, by being entirely defeated by the duke of Bavaria and the imperial generals at the battle of Prague; and he was even deprived of his electorate, the best part of which was given to the duke of Bavaria. The Protestant princes of Germany, however, had among them at this time many able commanders, who were at the head of armies, and continued the war with wonderful obstinacy: among them were the margrave of Baden Durlach, Christian duke of Brunswick, and count Mansfield; the last was one of the best generals of the age. Christiern IV. king of Denmark declared for them; and Richlieu, the French minister, was not fond of seeing the house of Austria aggrandized. The emperor, on the other hand, had excellent generals; and Christiern, having put himself at the head of the evangelic league, was defeated by Tilly, an Imperialist of great reputation in war. Ferdinand made so moderate a use of his advantages obtained over the Protestants, that they formed a fresh confederacy at Leipzig, of which the celebrated Gustavus Adolphus king of Sweden was the head. An account of his glorious victories is given under the article SWEDEN. At last he was killed at the battle of Lutzen in 1632. But the Protestant cause did not die with him. He had brought up a set of heroes, such as the duke of Saxe Weimer, Torstenfon, Banier, and others, who shook the Austrian power; till, under the mediation of Sweden, a general peace was concluded among all the belligerent powers, at Munster, in the year 1648; which forms the basis of the present political system of Europe.

Ferdinand II. was succeeded by his son Ferdinand III. This prince died in 1657; and was succeeded by the emperor Leopold, a severe, unamiable, and not very fortunate prince. He had two great powers to contend with, France on the one side, and the Turks on the other; and was a loser in his war with both. Louis XIV. at that time king of France, was happy in having the two celebrated generals Condé and Turenne in his service. The latter had already distinguished himself by great exploits against the Spaniards; and, on the accession of Leopold, the court of France had taken the opportunity of confirming the treaty of Munster, and attaching to her interest several of the independent princes of Germany. The tranquillity which now took place, however, was not established upon any permanent basis. War with Spain was resumed in the year 1668; and the great successes of Turenne in the Netherlands stimulated the ambition of the prince of Condé to attempt the conquest of Franche Comte at that time under the protection of the house of Austria. This was accomplished in three weeks: but the rapid success of Louis had awakened the jealousy of his neighbours to such a degree, that a league was formed against him by England, Holland, and Sweden; and the French monarch, dreading to enter the lists with such formidable enemies, consented to the treaty of Aix-la-Chapelle, by which, among other articles, Franche Comte was restored. The flames of war, however, were renewed by the insatiable ambition of the French monarch; who, having entered

Germany. ed into an alliance with Charles II. of England, aimed at nothing less than the total overthrow of the Dutch republic. The events of that war are related under the article UNITED PROVINCES: here it is sufficient to observe, that the misfortunes of the Dutch excited the compassion of the emperor and court of Spain, who now openly declared themselves their allies. Turenne was opposed by the prince of Orange in conjunction with the celebrated imperial general Montecuculi, whose artful conduct eluded even the penetration of Turenne, and he sat down suddenly before the city of Bonn. Here he was joined by the prince of Orange, who had likewise found means to elude the vigilance of the French generals. Bonn surrendered in a short time, and several other places in Cologne fell into the hands of the allies; who likewise cut off the communication betwixt France and the United Provinces; so that Louis was soon obliged to recal his armies, and abandon all his conquests with greater rapidity than they had been made. In 1674 he was abandoned by his ally Charles II. of England, and the bishop of Munster and elector of Cologne were compelled to renounce their allegiance to him; but notwithstanding these misfortunes, he continued every where to make head against his enemies, and even meditated new conquests. With a powerful army he again invaded Franche Comte in person, and in six weeks reduced the whole province to his obedience. In Alsace, Turenne defeated the imperial general at Sintzheim, and ravaged the palatinate. Seventy thousand Germans were surprised; a considerable detachment was cut in pieces at Mulhausen; the elector of Brandenburg, who had been entrusted with the chief command, was routed by Turenne near Colmar; a third body met with a similar fate at Turkheim; and the whole German forces were obliged at last to evacuate the province and repass the Rhine.

In consequence of these disasters the Imperial general Montecuculi was recalled to act against Turenne. The military skill of the two commanders seemed to be nearly equal; but before the superiority could be adjudged to either, Turenne was killed by a cannon ball as he was reconnoitring a situation for erecting a battery. By his death the Imperialists obtained a decided superiority. Montecuculi penetrated into Alsace; and the French, under de Lorges nephew to the deceased general, were happy in being able to escape a defeat.

Part of the German army now sat down before Treves, where they were opposed by Marechal Crequi; but the negligence of that general exposed him to such a dreadful defeat, that he was obliged to fly into the city with only four attendants. Here he endeavoured in vain to animate the people to a vigorous defence. The garrison mutinied against his authority; and, when he refused to sign the capitulation they made, delivered him up prisoner to the enemy. Louis in the mean time had taken the field in person against the prince of Orange; but the disastrous state of affairs in Germany induced him to recall the prince of Condé to make head against Montecuculi. In this campaign the prince seemed to have the advantage. He compelled the Germans to raise the sieges of Hagenau and Saverne; and at last to repass the Rhine without having been able to force him to a battle.

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Germany. This was the last campaign made by these celebrated commanders; both of them now, contented with the fame they had acquired, retiring from the field to spend the remainder of their days in peace. The excellent discipline, however, which the two great French generals had introduced into their armies, still continued to make them very formidable, though it did not always insure them of victory. In Germany, the duke of Lorraine, who had recovered Philipsburgh, was repeatedly defeated by Marechal Crequi, who had been ransomed from his captivity, and become more prudent by his defeat. In Flanders, the prince of Orange was overmatched by the duke of Orleans and Marshal Luxembourg. A peace was at length concluded at Nimeguen in 1679, by which the king of France secured himself Franche Comte with a great many cities in the Netherlands; while the king of Sweden was reinstated in those places of which he had been stripped by the Danes and Germans. This tranquillity, however, was of no long duration. Louis employed every moment in preparations for new conquests; possessed himself of the imperial city of Strasburg by treachery; and dispossessed the Elector Palatine and the elector of Treves of the lordships of Falkenburg, Germansheim, and Valdentz. On the most frivolous pretences he had demanded Alost from the Spaniards; and on their refusal, seized upon Luxembourg. His conduct, in short, was so intolerable, that the prince of Orange, his inveterate enemy, found means to unite the whole empire in a league against him. Spain and Holland became parties in the same cause; and Sweden and Denmark seemed also inclined to accede to the general confederacy. Notwithstanding this formidable combination, however, Louis seemed still to have the advantage. He made himself master of the cities of Philipsburgh, Mannheim, Frankendal, Spire, Worms, and Oppenheim; the fruitful country of the palatinate was ravaged in a dreadful manner; the towns were reduced to ashes; and the people, driven from their habitations, were every where left to perish through the inclemency of the weather and want of provisions. By this cruelty his enemies were rather exasperated than vanquished: the Imperialists, under the conduct of the duke of Lorraine, resumed their courage, and put a stop to the French conquests. At length all parties, weary of a destructive war, consented to the treaty of Ryswick in 1697. By this treaty Louis gave up to the empire, Fribourg, Brisac, Kehl, and Philipsburg: he consented also to destroy the fortifications of Strasburg. Fort Louis and Traerbach, the works of which had exhausted the skill of the great Vauban, with Lorraine, Treves, and the Palatinate, were resigned to their respective princes; insomuch that the terms to which the French monarch now consented, after so many victories, were such as could scarce have been expected under the pressure of the greatest misfortunes. The views of Louis, however, in consenting to this apparently humiliating treaty, were beyond the views of ordinary politicians. The health of the king of Spain was in such a declining way, that his death appeared to be at hand; and Louis now resolved to renew his pretensions to that kingdom, which he had formerly by treaty solemnly renounced. His designs in this respect could not be concealed from the vigilance of

William

any. William III. of Britain; of which Louis being sensible, and knowing that the emperor had claims of the same nature on Spain, he thought proper to enter into a very extraordinary treaty with William. This was no less than the partition of the whole Spanish dominions, which were now to be distributed in the following manner. To the young prince of Bavaria were to be assigned Spain and the East Indies; the dauphin, son to Louis, was to have Naples, Sicily, and the province of Guipuscoa; while the Archduke Charles, son to the Emperor Leopold, was to have only the duchy of Milan. By this scandalous treaty the indignation of Charles was roused, so that he bequeathed the whole of his dominions to the prince of Bavaria. This scheme, however, was disconcerted by the sudden death of the prince; upon which a new treaty of partition was concluded between Louis and William. By this the kingdom of Spain, together with the East India territories, were to be bestowed on the Archduke Charles, and the duchy of Milan upon the duke of Lorraine. The last moments of the Spanish monarch were disturbed by the intrigues of the rival houses of Austria and Bourbon; but the haughtiness of the Austrian ministers so disgusted those of Spain, that they prevailed upon their dying monarch to make a new will. By this the whole of his dominions were bequeathed to Philip duke of Anjou, grandson to the king of France; and Louis, prompted by his natural ambition, accepted the kingdom bequeathed to his grandson, excusing himself to his allies in the best manner he could for departing from his engagements with them. For this, however, he was made to pay dear. His insatiable ambition and his former successes had alarmed all Europe. The Emperor, the Dutch, and the king of England, entered into a new confederacy against him; and a bloody war ensued, which threatened to overthrow the French monarchy entirely. While this war (of which an account is given under the article BRITAIN) was carried on with such success, the Emperor Leopold died in the year 1705.

He was succeeded by his son Joseph, who put the electors of Cologne and Bavaria to the ban of the empire; but being ill served by Prince Louis of Baden general of the empire, the French partly recovered their affairs, notwithstanding their repeated defeats. The duke of Marlborough had not all the success he expected or deserved. Joseph himself was suspected of a design to subvert the Germanic liberties; and it was plain by his conduct, that he expected England should take the labouring oar in the war, which was to be entirely carried on for his benefit. The English were disgusted at his slowness and selfishness: but he died in 1711, before he had reduced the Hungarians; and leaving no male issue, he was succeeded in the empire by his brother Charles VI. whom the allies were endeavouring to place on the throne of Spain, in opposition to Philip duke of Anjou, grandson to Louis XIV.

When the peace of Utrecht took place in 1713, Charles at first made a show as if he would continue the war; but found himself unable, now that he was forsaken by the English. He therefore was obliged to conclude a peace with France at Baden in 1714, that he might attend the progress of the Turks in Hungary; where they received a total defeat from Prince

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Eugene at the battle of Peterwaradin. They received another of equal importance from the same general in 1717, before Belgrade, which fell into the hands of the Imperialists; and next year the peace of Passarowitz, between them and the Turks, was concluded. Charles employed every minute of his leisure in making arrangements for increasing and preserving his hereditary dominions in Italy and the Mediterranean. Happily for him, the crown of Britain devolved to the house of Hanover; an event which gave him a very decisive weight in Europe, by the connections between George I. and II. and the empire. Charles was sensible of this; and carried matters with so high a hand, that, about the years 1724 and 1725, a breach ensued between him and George I. and so unsteady was the system of affairs all over Europe at that time, that the capital powers often changed their old alliances, and concluded new ones contradictory to their interest. Without entering into particulars, it is sufficient to observe, that the safety of Hanover, and its aggrandizement, was the main object of the British court; as that of the emperor was the establishment of the pragmatic sanction in favour of his daughter the (late empress-queen), he having no male issue. Mutual concessions upon those great points restored a good understanding between George II. and the emperor Charles; and the elector of Saxony, flattered with the view of gaining the throne of Poland, relinquished the great claims he had upon the Austrian succession.

The emperor, after this, had very bad success in a war he entered into with the Turks, which he had undertaken chiefly to indemnify himself for the great sacrifices he had made in Italy to the princes of the house of Bourbon. Prince Eugene was then dead, and he had no general to supply his place. The system of France, however, under cardinal Fleury, happened at that time to be pacific; and she obtained for him, from the Turks, a better peace than he had reason to expect. Charles, to keep the German and other powers easy, had, before his death, given his eldest daughter, the late empress-queen, in marriage to the duke of Lorraine, a prince who could bring no accession of power to the Austrian family.

Charles died in 1740; and was no sooner in the grave, than all he had so long laboured for must have been overthrown, had it not been for the firmness of George II. The young king of Prussia entered and conquered Silesia, which he said had been wrongfully dismembered from his family. The king of Spain and the elector of Bavaria set up claims directly incompatible with the pragmatic sanction, and in this they were joined by France; though all those powers had solemnly guaranteed it. The imperial throne, after a considerable vacancy, was filled up by the elector of Bavaria, who took the title of *Charles VII.* in January 1742. The French poured their armies into Bohemia, where they took Prague; and the queen of Hungary, to take off the weight of Prussia, was forced to cede to that prince the most valuable part of the duchy of Silesia by a formal treaty.

Her youth, her beauty, and sufferings, and the noble fortitude with which she bore them, touched the hearts of the Hungarians, into whose arms she threw herself and her little son; and though they had been always remarkable for their disaffection to the

Germany. house of Austria, they declared unanimously in her favour. Her generals drove the French out of Bohemia; and George II. at the head of an English and Hanoverian army, gained the battle of Dettingen, in 1743. Charles VII. was at this time miserable on the imperial throne, and would have given the queen of Hungary almost her own terms; but she haughtily and impolitically rejected all accommodation, though advised to it by his Britannic majesty, her best and indeed only friend. This obstinacy gave a colour for the king of Prussia to invade Bohemia, under pretence of supporting the imperial dignity; but though he took Prague, and subdued the greatest part of the kingdom, he was not supported by the French; upon which he abandoned all his conquests, and retired into Silesia. This event confirmed the obstinacy of the queen of Hungary; who came to an accommodation with the emperor, that she might recover Silesia. Soon after, his Imperial majesty, in the beginning of the year 1745, died; and the duke of Lorraine, then grand duke of Tuscany, consort to the queen of Hungary, after surmounting some difficulties, was chosen emperor.

The bad success of the allies against the French and Bavarians in the Low Countries, and the loss of the battle of Fontenoy, retarded the operations of the empress-queen against his Prussian majesty. The latter beat the emperor's brother, Prince Charles of Lorraine, who had before driven the Prussians out of Bohemia; and the conduct of the empress-queen was such, that his Britannic majesty thought proper to guarantee to him the possession of Silesia, as ceded by treaty. Soon after, his Prussian majesty pretended that he had discovered a secret convention which had been entered into between the empress-queen, the empress of Russia, and the king of Poland as elector of Saxony, to strip him of his dominions, and to divide them among themselves. Upon this his Prussian majesty, very suddenly, drove the king of Poland out of Saxony, defeated his troops, and took possession of Dresden; which he held till a treaty was made under the mediation of his Britannic majesty, by which the king of Prussia acknowledged the duke of Lorraine, great duke of Tuscany, for emperor. The war, however, continued in the Low Countries, not only to the disadvantage, but to the discredit, of the Austrians and Dutch, till it was finished by the treaty of Aix-la-Chapelle, in April 1748. By that treaty Silesia was once more guaranteed to the king of Prussia. It was not long before that monarch's jealousies were renewed and verified; and the empress of Russia's views falling in with those of the empress-queen and the king of Poland, who were unnaturally supported by France in their new schemes, a fresh war was kindled in the empire. The king of Prussia declared against the admission of the Russians into Germany, and his Britannic majesty against that of the French. Upon those two principles all former differences between these monarchs were forgotten, and the British parliament agreed to pay an annual subsidy of 670,000*l.* to his Prussian majesty during the continuance of the war.

The flames of war now broke out in Germany with greater fury and more destructive violence than ever. The armies of his Prussian majesty, like an irresistible

torrent, burst in Saxony; totally defeated the imperial general Brown at the battle of Lowositz; forced the Saxons to lay down their arms, though almost impreguably fortified at Pirna; and the elector of Saxony fled to his regal dominions in Poland. After this, his Prussian majesty was put to the ban of the empire; and the French poured, by one quarter, their armies, as the Russians did by another, into the empire. The conduct of his Prussian majesty on this occasion is the most amazing that is to be met with in history; for a particular account of which, see the article PRUSSIA.

At last, however, the taking of Colberg by the Russians, and of Schweidnitz by the Austrians, was on the point of completing his ruin, when his most formidable enemy, the empress of Russia, died, January 5th 1762; George II. his only ally, had died on the 25th of October 1760.

The deaths of those illustrious personages were followed by great consequences. The British ministry of George III. fought to finish the war with honour, and the new emperor of Russia recalled his armies. His Prussian majesty was, notwithstanding, so very much reduced by his losses, that the empress-queen, probably, would have completed his destruction, had it not been for the wise backwardness of other German princes, not to annihilate the house of Brandenburg. At first the empress-queen rejected all terms proposed to her, and ordered 30,000 men to be added to her armies. The visible backwardness of her generals to execute her orders, and new successes obtained by his Prussian majesty, at last prevailed on her to agree to an armistice, which was soon followed by the treaty of Hubertsburgh, which secured to his Prussian majesty the possession of Silesia. Upon the death of the emperor her husband, in 1765, her son Joseph, who had been crowned king of the Romans in 1764, succeeded him in the empire.

This prince showed an active and restless disposition, much inclined to extend his territories by conquest, and to make reformations in the internal policy of his dominions, yet without taking any proper methods for accomplishing his purposes. Hence he was almost always disappointed; inasmuch that he wrote for himself the following epitaph: "Here lies Joseph, unfortunate in all his undertakings." In the year 1788, a war commenced betwixt him and the king of Prussia; in which, notwithstanding the impetuous valour of that monarch, Joseph acted with such caution that his adversary could gain no advantage over him; and an accommodation took place without any remarkable exploit on either side. In 1781 he took the opportunity of the quarrel betwixt Britain and the United Provinces, to deprive the latter of the barrier towns which had been secured to them by the treaty of Utrecht. These indeed had frequently been of great use to the House of Austria in its state of weakness; but Joseph, conscious of his own strength, looked upon it as derogatory to his honour to allow so many of his cities to remain in the hands of foreigners, and to be garrisoned at his expence. As at that time the Dutch were unable to resist, the Imperial orders for evacuating the barrier towns were instantly complied with; nor did the court of France, though then in friendship with Holland, make any offer to interpose. Encouraged by this success, Joseph next demanded the free

navigation of the Scheldt; but as this would evidently have been very detrimental to the commercial interests of Holland, a flat refusal was given to his requisitions. In this the emperor was much disappointed; having flattered himself that the Hollanders, intimidated by his power, would yield the navigation of the river as easily as they had done the barrier. Great preparations were made by the emperor, which the Dutch, on their part, seemed determined to resist. But while the emperor appeared so much set upon this acquisition, he suddenly abandoned the project entirely, and entered into a new scheme of exchanging the Netherlands for the duchy of Bavaria. This was opposed by the king of Prussia; and by the interference of the court of France, the emperor found himself at last obliged also to abandon his other scheme of obtaining the navigation of the Scheldt. A treaty of peace was concluded, under the guarantee of his most Christian majesty. The principal articles were, that the States acknowledged the emperor's sovereignty over the Scheldt from Antwerp to the limits of Seftingen; they agreed to demolish certain forts, and to pay a considerable sum of money in lieu of some claims which the emperor had on Maeltricht, and by way of indemnification for laying part of his territories under water.

The treaty with the Dutch was no sooner concluded than a quarrel with the Turks took place, which terminated in an open war. It does not appear that the emperor had at this time any real provocation, but seems to have acted merely in consequence of his engagements with Russia to reduce the dominions of the Grand Signor. All these foreign engagements, however, did not in the least retard the progress of reformation which the emperor carried on throughout his dominions with a rapidity scarcely to be matched, and which at last produced the revolt of the Austrian Netherlands. In the course of his labours in this way a complete code of laws was compiled. These were at first greatly commended for their humanity, as excluding almost entirely every species of capital punishment; yet, when narrowly considered, the commutations were found to be so exceedingly severe, that the most cruel death would, comparatively speaking, have been an act of mercy. Even for smaller crimes the punishments were severe beyond measure; but the greatest fault of all was, that the modes of trial were very defective, and the punishments so arbitrary, that the most perfect and innocent character lay at the mercy of a tyrannical judge. The innovations in ecclesiastical matters were, however, most offensive to his subjects in the Netherlands. Among the many changes introduced into this department, the following were some of the most remarkable. 1. An abridgment of divine service. 2. A total suppression of vocal performers in choirs. 3. The introduction of the vernacular language instead of the Latin in administering the sacraments. 4. The prohibition of chanting hymns in private houses. 5. The suppression of a great number of religious houses, and the reduction of the number of the clergy. 6. The total abolition of the papal supremacy throughout the Imperial dominions. The same spirit of innovation displayed itself even in the most minute matters. Many favours were bestowed upon the Jews; and in 1786 the emperor wrote with his own hand to the different handicraft and tra-

ding corporations in Vienna, requesting that their youth might be received as apprentices in that city. Severe laws against gaming were enacted and put in execution with equal rigour. Heavy restrictions were also laid on all the societies of free masons in Germany, while those in the Netherlands were totally suppressed.

The great number of innovations in religious matters were highly resented by the inhabitants of the Netherlands, who have always been remarkable for their attachment to the Romish religion in its most superstitious form. Indeed the alterations in the civil constitution were so great, that even those who were least bigotted in this respect began to fear that their liberties were in danger, and an universal dissatisfaction was excited. The emperor behaved at first in a very haughty manner, refused to yield the smallest point to the solicitations of his subjects. Finding, however, that a general revolt was about to take place, and being unable at that time, on account of the Turkish war, to spare such a force as would be necessary to reduce the provinces to obedience, he thought proper, in the autumn of 1787, to promise a restoration of their ancient constitution and privileges. His promises, however, were found to be so delusive, and his conduct was so arbitrary and capricious, that in the end of the year 1789 the States of all the provinces in the Austrian Netherlands came to a resolution of entirely throwing off the yoke. Articles of a federal union were drawn up, and a new republic was formed under the title of the *Belgic Provinces*. The situation of the emperor's affairs at that time did not allow him to take the measures necessary for preventing this revolt; to which perhaps his ill state of health also contributed. About the beginning of February 1790 his distemper increased to such a degree as to be thought dangerous; and continuing daily to grow worse, he sunk under it on the 20th of the same month, in the 40th year of his age, and 26th of his reign.

The leaders of the Austrian revolution, however, soon became so disagreeable to their countrymen, that they were obliged to fly; and the congress, which had been established as the supreme legislative body, behaved with such tyranny, that they became generally detested. Mean time, the late emperor was succeeded by his brother Peter Leopold Joseph grand duke of Tuscany; under whose administration matters have taken a more favourable turn. By his wisdom, moderation, and humanity, he has already in a great measure retrieved the bad consequences of his predecessor's conduct, having made peace with the Ottomans, and regained the allegiance of the Netherlands; and upon the whole seems to be actuated not more by a sense of his own rights, than by a regard to the rights and happiness of his subjects.

At present, Germany is bounded, on the north, by the Baltic Sea, Denmark, and the German Ocean; on the east, by Prussia, Hungary, and Poland; and on the west, by the Low Countries, Lorraine, and Franche Comte: so that it now comprehends the Palatinate, of Cologne, Triers, and Liege, which formerly belonged to the Gauls; and is dismembered of Friesland-Groningen, and Overijssel, which are now incorporated with the Low Countries.

Since the time of Charles the Great, this country

²¹ Germany has been divided into High and Low Germany. The first comprehends the Palatinate of the Rhine, Franconia, Suabia, Bavaria, Bohemia, Moravia, Austria, Carinthia, Carniola, Stiria, the Swiss, and the Grisons. The provinces of Low Germany are, the Low Country of the Rhine, Triers, Cologne, Mentz, Westphalia, Hesse, Brunswick, Misnia, Lusatia, High Saxony upon the Elbe, Low Saxony upon the Elbe, Mecklenburg, Lunenburg, Brandenburg, and Pomerania.

²² Constitution of the empire. Monarchy was first established in Germany by Clovis: after him Charlemagne extended his power and his dominions; and so great had the empire become, that during his reign, and that of his son, government was administered in the provinces by persons vested with power for that purpose under the title of *Dukes*. In the districts of these provinces, justice was distributed by a *comes* or count, which officer was in German called *Graf*. But from their courts lay an appeal to that of the emperor, before a president styled *Comes Palatinus*, that is, "count Palatine, or of the palace," in German denominated *Pfalzgraf*. The frontiers or marches were governed by a *marquis*, styled by the Germans *Markgraf*, similar to our lord warden. Generally the centre of the empire was ruled by an officer, who possessed a similar power, but a greater extent of dominion, than the *Grave*, under the title of *Landgrave*. Towns and castles, which were occasionally honoured with the residence of the emperor, were governed by a *Burggraf*. It may be remarked, however, that the signification of the above mentioned titles, and the extent of power which they conferred upon the persons honoured with them, differ according to the successive ages and the gradual development of the German constitution.

By reason of family broils in the Imperial house, and civil wars in the dominions, the dignity of the sovereign was depressed, and a new form in the government raised up. The dukes exalted themselves above the power of the emperor, and secured for their sons a succession to their greatness; while the interest of the sovereign, in order to strengthen the bond of personal attachment, ratified to others and their descendants that sway which had been formerly delegated and dependant on his will. Hence arose the modern constitution of distinct principalities, acknowledging one head in the person of an emperor. But shortly after the election of Conrade duke of Franconia to the throne, this new-gained authority of the princes became doubtful. However, after most violent disturbances and confusions, the regulations yielded to by Albert II. and his successors, particularly by Frederick III. laid the foundation of the German constitution: but the power and form of which were afterwards improved by Maximilian. Before Charles V. mounted the throne, on the death of Maximilian, the electors formed a bulwark against the Imperial power, by an instrument called the *capitulation*; to which articles of government he and all emperors elected since have sworn previous to their investiture with imperial dignity.

²³ Of the electors. When the German monarchy received an elective form, the right of election was not limited to the great officers of state, for other princes participated of this privilege. But the empire being governed by four dukes, the princes under their authority, in order to

court their favour, gave to them the disposal of their votes, and of those of their vassals. The three archbishops also, who were necessarily present at the coronation, obtained the electoral dignity. However, beside this origin of the modern electors, the high stations about court procured their possessors an influence over other members, and their general residence there gave them a solid advantage in their constant and early presence at the diet of election. For in times of turbulence several emperors were elected, when princes had not an opportunity to attend. And hence sprung up a sanction to that right, which the high officers of the household had assumed, of electing without any consultation of the other members of the empire. Pope Gregory X. too, either conceiving that they did possess, or willing that they should acquire, this right, exhorted them in a bull to terminate the troubles of Germany by electing an emperor. And since that period they have been held as the sole electors. But the possession of this high power was strengthened by a league amongst themselves called the *electoral union*, which received additional confirmation from the emperor Louis of Bavaria, and was formally and fully ratified by that famous constitution of Charles IV. termed the *golden bull*; according to which, the territories and the high offices by which the electoral dignity is conveyed, must descend according to the right of primogeniture, and are indivisible.

The golden bull declares the following number and titles of the electors: The archbishop of Mentz as great chancellor of the German empire; the elector of Cologne as great chancellor of the empire in Italy; the elector of Triers as great chancellor of the empire in Gaul and Arles; the king of Bohemia as cup-bearer; the count Palatine as high steward; the duke of Saxony as grand marshal; the margrave of Brandenburg as grand chamberlain. The number originally was seven, but the emperor Leopold created the duke of Lunenburg, ancestor to our present British sovereign, an elector; to whom the post of arch-treasurer was afterwards given; and thus Hanover forms the eighth electorate. But this number cannot be increased by the emperor without a previous election by the electors themselves; who, thus capable of electing and of being elected, may style themselves *Coinperantes*; and they exercise part of the imperial authority, if a vacancy of the throne happen. But when or before this occurs, the election of the emperor is proceeded to after the following manner: The elector of Mentz, before the lapse of a month after the death of the emperor, summons, as great chancellor of the empire, the rest of the electors to attend on some fixed day within the space of three months from the date of the summons. The electors generally send their ambassadors to the place of election, which is held at Frankfort on the Mayne; but saving the right of the city of Frankfort, it may be held elsewhere.

When the diet of electors is assembled, they proceed to compose the capitulation, to which the emperor when elected is to swear. The capitulation being adjusted, the elector of Mentz appoints a day for the election. When this day arrives, the gates of the city are shut, and the keys delivered to the elector of Mentz. The electors or their ambassadors, protestants excepted, repair in great pomp to mass; and after its celebration

²⁴ Election of the emperor.

Germany. bration they take a solemn oath to choose, unbiassed and uninfluenced, the person that appears most proper for the imperial dignity. After this they repair to the sacristy, where the elector of Mentz first asks, if there be any impediment known against their proceeding at present to an election? and next he obtains a promise, that the person elected by the majority shall be received as emperor. The declarations of the electoral ambassadors, in respect to these two points, are recorded by two notaries of the empire. Then all witnesses withdraw; and the elector of Mentz collecting the suffrages, which are *viva voce*, and giving his own last, the witnesses are recalled, and he declares the person whom the electors have chosen. But the election is not complete, nor is the new emperor proclaimed, until the capitulation be sworn to either by himself or by his ambassadors if he be absent. From this time he is styled king of the Romans until the coronation takes place; which ceremony confers the title of emperor. According to the golden bull, it should be celebrated at Aix-la-Chapelle, out of respect to Charlemagne, who resided there; but saving the right to Aix-la-Chapelle, it may take place elsewhere. The coronation is performed by the archbishop of Mentz or elector of Cologne. And when he is seated on his throne, the duke of Saxony delivers into his hand the sword of Charles the Great, with which he makes some knights of the holy Roman empire, and is also obliged to confer that honour upon such others as are nominated by the respective electors. When he proceeds to dinner in the great hall, he is seated at a table elevated two steps higher than that of the electors, and is served by counts of the empire. The electors, each of whom has also his table, are attended by the gentlemen of their respective courts. These electors, who assist personally at the ceremony, sit and eat at their own tables; but those who are represented by ambassadors have only their tables covered out of form with plates, at which the ambassadors do not sit.

For the benefit of the empire during the reign of an emperor, his presumptive successor may be elected king of the Romans. But this election confers at first a mere title; for by an express article in his capitulation, the king of the Romans swears not to interfere with the government during the life of the emperor; but on his decease, the coronation confirms him emperor without a second election.

Should there not be a king of the Romans, and the throne become vacant, the government is administered by vicars of the empire, who are the electors Palatine and of Saxony, as count palatine and arch-marshal of the empire. Each has his district and tribunal of the vicariate; and by the golden bull it is established, that all acts of the vicars are valid; but they are all fully confirmed by the emperor; which confirmation, by an article of his capitulation, he is bound to give.

There are also vicars of the emperor. These offices are constituted by a delegation of the imperial power from the emperor to any prince of the empire, when he is unable to execute his authority himself. But these vicars stand accountable to the emperor; their acts may be annulled and their offices revoked, all dependant on the will of the emperor, and determinable at his pleasure.

When the race of Charlemagne ceased to govern in Germany, the princes and states associated to continue the empire; and that its majesty might be visible, and its laws enforced, they agreed to choose an emperor. From this emperor all electors and princes except those before 1582 receive investiture of their dominions; counts and free cities from the Aulic council. But this investiture is no more than a sign of submission to the majesty of the empire, which is deposited in the emperor. For as the constituted members of the empire are dependent on that collective union from which they derive protection, they therefore show this dependence on the emperor, because he represents the majesty of that union or of the empire; but in all other respects they are independent and free.

These princes or sovereigns may even wage war with the prince wearing the imperial crown, as possessed of other titles and dominions unconnected with his imperial station. Nor can the sovereignty of any member be affected so long as he remains loyal to the empire; which loyalty constitutes his duty, and secures him its protection. But should he be guilty of any violation against the emperor, as head of the empire, such a crime would commit him to the punishment of its laws, and he would be put under the ban. For this crime would be against that collective body of sovereigns whose union constitutes the empire; and therefore any violation of that union is justly punished with deprivation of these territories which render such sovereigns members of the empire. Nor can this punishment of the ban derogate from the dignity of those princes who derive their sovereignty from this constitution, and whose subjection is an act of their own consent. However, no member of the empire can at present be put under the ban without being first heard, and without the concurrence of the electors, princes, and states, being previously obtained.

The emperor is endowed with many privileges, and his power partly appears in the exercise of his reserved rights, or the peculiar prerogatives annexed to the imperial dignity. He grants to princes the investiture of their dominions; but to this he is bound as the laws direct. He confers titles, but promises that they shall be bestowed only on such persons as will maintain their dignity, and can support their rank. Beside, he can give merely the title; for the power or privilege of prince or count can be obtained only from their respective bodies. But in some instances, even titles are of high importance. For the descendants of a prince are incapable of succession, if their mother be of inferior rank to their father; but the conferring of a title ennobles her and removes the bar, if the collateral line consents.

The emperor can also make cities, found universities, grant the privilege of fairs, &c. He can also dispense with the tedious terms of minority, and empower princes to assume at an earlier age the government of their own dominions. He decides all rank and precedence, and has a power of *prima preces*, that is, of granting for once in every chapter of the empire a vacant seat. But he is not above the law; for electors have not only chosen but deposed emperors. However, the influence of the capitulation is to prevent such rigorous proceedings: but should the capitulation be violated, the college of electors might proceed to remonstrance; and if these remonstrances should

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Powers of
the emperor.

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^{Germany.} be without effect, in conjunction with the diet, they might resort to more forcible remedies.

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Diet of the empire. The diet is that assembly of the states in which the legislative power of the empire resides; and is composed of the electors, princes, prelates, counts, and free cities of the empire. It has sat since 1663, and is held usually at Ratibon. The emperor, when present, presides in person; when absent, by his commissary, whose communication of proposals from the emperor to the assembly is called the *commissorial decree*. The elector of Mentz, as chancellor of the empire, is director of the diet; and to his chancery are all things addressed that are to be submitted to the empire; the reading of which by his secretary to the secretaries of the other ministers at the diet is denominated *per dictaturam*, and constitutes the form of transmitting papers or memorials to the dictature of the empire.—The diet is composed of three distinct colleges, each of which has its particular director. The first college is that of electors; of which the archbishop of Mentz is director as first elector. The second college is that of princes. It consists of princes, archbishops, and bishops; and of prelates, abbots, and counts, who are not considered as princes. Each prince spiritual and temporal has a vote, but prelates and counts vote by benches. The prelates are divided into two benches, the counts into four; and each bench has only one vote. The archduke of Austria and the archbishop of Saltzburg are alternately directors of the college of princes. The third college is that of the free cities of the empire; the director of which is the minister of the city in which the diet happens to sit.

In all these colleges, the sentiments of the majority are conclusive, except in respect of fundamental laws, which affect the whole empire, or such matters as relate to religion. In these they must be unanimous.

Where religion is interested, the proceedings are also different. The colleges are then considered as consisting of two bodies, the evangelic and the catholic; and if any religious point be proposed, it must meet not only the unanimous concurrence of the proposing body, but must have the majority of the other to establish it. This distinction arose from a conjunction called the *evangelic body*; which was formed by the Protestant states and princes to guard the Protestant interest in Germany, by watching over the laws for the security of their religion, and, in case of violation, by obtaining redress from the imperial throne. For in any part of the empire, as in the palatinate, where the count is a Papist and the subjects are Protestants, should oppressions arise, application would be made to the evangelic body through the director. The elector of Saxony is director of the evangelic body, though he is a Papist: but therefore his representations in favour of the Protestants have more force; and beside, should he abuse an office which invests him with considerable weight and influence, he could be instantly deprived of it.

The first two colleges are styled superior, and in effect constitute the diet: for all points that come before the diet, are generally first deliberated in the college of electors, and pass from that to the college of princes; in which, if any objection arise, a free conference takes place between the directors of each college. And should they, in consequence of this free

conference, concur, they invite the third college to accede to their joint opinion; which invitation is generally complied with: but should this college return a refusal, the opinion of the other two colleges is in some few cases engrossed in the chancery, and delivered to the emperor's commissary as the opinion of the empire. The opinion of the third college is merely mentioned at the close. However, though the superior colleges do in effect constitute the diet; yet the received maxim is, that no two colleges constitute a majority, that is, the majority of voices at the diet; nor can the emperor confirm the opinion of two colleges as an opinion of the diet. By the peace of Westphalia, a decisive vote was recognized as a right of the imperial cities, which the two superior colleges should not infringe upon; their vote being, by the fundamental law, of equal weight with that of the electors and princes.

After a measure is approved of by the colleges, it is submitted to his Imperial majesty to receive his negative or confirmation. Should he approve the point, it is published in his name as the resolution of the empire, which states are exhorted to obey, and tribunals desired to consider as such.

The diet not only makes and explains laws, but decides ambiguous cases. It must also be consulted before war is made; appoints the field-marshal who is to command the army, and assigns him his council of war. The diet also enters into and makes alliances, but usually empowers the emperor to negotiate them; and foreign states have their ambassadors at the diet, but the diet sends no ministers to foreign courts.

In the origin of the empire, justice was administered in the districts of the provinces by counts, and appeals lay from their courts to that of the emperor before the count palatine. But as civil broils shook the power of the emperor, they interrupted also the course of justice. The consequent inconveniences caused several solicitations to be preferred from the states to different emperors for the establishment of a court of justice, which should take cognizance of great as well as small causes. And at length such a court was erected by Maximilian I. under the title of the *Imperial Chamber at Worms*, in the year 1495; but was removed to Spire in 1533, and to Wetzlar in 1696, where it is now held. The members of this court are a judge of the chamber and 25 assessors, partly Protestants partly Papists. The president is appointed by the emperor, the assessors by the states. The court receives appeals from inferior jurisdictions, and decides dubious titles; and all causes before it between prince and prince, or princes and private persons, are adjudged according to the laws of the respective parties, or according to the Imperial law. This tribunal is under the inspection of visitors appointed by the states; and, during their visitation, the sentences of the court are subject to revision. Appeals lie afterward also from the judgment of the visitors to that of the diet.

The emperors, finding themselves deprived of many of their powers, wished to raise their prerogatives by forming a tribunal, of which they should name the judges, and before whom causes in the last resort should come. But Maximilian foresaw, in respect to the new tribunal, that though a consciousness of its importance made the states struggle for its erection, the expences of its establishment would make them neglect

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Admini-
stration of
justice, &c.

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Germany. its support; and the event bore witness to his sagacity. But when, through the omissions and negligence of the states, there happened to be a cessation in the distribution of justice by the Imperial chamber, he revived his court of the count Palatinate or Aulic council. And in order to gain the quiet acquiescence of the states, under the mask of a partition of power, and of generous moderation, he desired them to add eight to the number of assessors, and the salaries of all should be discharged by him. The states swallowed the bait, but soon perceived that they had lost part of their liberty.

The emperor, by keeping the tribunal always open, by filling its seats with men of first-rate talents, and by having its sentences duly and speedily executed, drew all causes before it. The states remonstrated, declaring, that the Imperial chamber ought to be not only the supreme, but sole tribunal of that kind. The emperor answered, that he had erected the Imperial chamber in consequence of their solicitations; but as they had not supplied the tribunal with judges, he provided for that deficiency by a constant administration of justice in the establishment of another.

The Aulic council now subsists with equal authority, each receiving appeals from inferior jurisdictions; but neither appealing to the other, as the *dernier resort* from both must be had to the diet. However, to the Aulic council belong the reserved rights of the emperor; and to the Imperial chamber also are annexed peculiar powers. The Imperial chamber subsists during a vacancy of the throne under the authority of the vicars of the empire; whereas the Aulic council does not exist until appointed by the succeeding emperor.

The Aulic council consists of a president, vice-president, and seventeen assessors, of whom six are Protestants. The vice-chancellor of the empire is also intitled to a seat; and all decrees issuing from the council pass through his hands to those who are to execute them. This tribunal obtains for the emperor, through the appeals from the courts of other princes, a new authority beside that which he possesses from his reserved rights; but electors and some princes, as those of Hanover, Austria, Brunswick, Swedish Pomerania, Hesse, are free from this dependence on the emperor, to whose Aulic council their subjects cannot appeal; nor can it take cognizance of ecclesiastical or criminal causes, both of which appertain to territorial justice; which we shall presently consider when we have surveyed the executive instrument of Imperial justice.

The division of the empire into circles is a regulation coeval with the establishment of the Imperial chamber by Maximilian, in order to strengthen the arm of justice with vigour to enforce its decrees. The original division was into six circles, which are called the *ancient circles*; and are Bavaria, Franconia, Suabia, Lower Saxony, the Upper Rhine, and Westphalia: but the powerful princes, who at first declined bringing their dominions under the form of circles, were led by a political finesse of the emperors to adopt the regulation, and increase the number to ten, by forming the four new circles of Austria, Burgundy, the electorate circle, and Upper Saxony.

Over these circles preside directors, to whom the tribunals of justice commit the execution of their decrees. The six old circles have two directors each,

Germany. the four new have one each. The office of director is permanent and hereditary, as it belongs always to the first prince in the circle, upon whom it confers high authority; for all the decrees of the Imperial chamber and Aulic council are of no avail unless the director will execute them.

The directors of the circles are not only instruments of war but of peace: for in case of an Imperial war, they are to collect the troops of the circle; and if any state or prince of their respective circles suffer violation from others, they are to yield protection and enforce the peace; or should there be any tumultuous uprisings of the people, the suppression of such belongs to them.

The emperor is the executive instrument of the whole empire; the directors are such of the constitutive parts called circles. The prosperity and security of which being at stake, the directors, as presidents, must hold frequent diets in their respective circles, in order to consult on and adopt salutary measures for their safety and welfare: but as the interests of those near to us are generally so intimately blended with our own, that the good of either cannot be pursued without the mutual concurrence of both, there arise negotiations on particular points between the diets of different circles, which are therefore styled *confederate circles*; and these negotiations being more frequent amongst the circles of the Upper and Lower Rhine, or Westphalia, they are denominated the *corresponding circles*.

Every prince is sovereign in his own country; and ²⁹ Powers of may enter into alliances, and pursue by all political the Ger- measures his own private interest, as other sovereigns man prin- do; for if even an Imperial war be declared, he may ces. remain neuter if the safety of the empire be not at stake.

Each state or sovereign appoints in general three colleges for its government. The first is the *geheimderath*, or privy council; the second is the *regierung*, or regency; the third the *rentkammer*, or chamber of finances. Each of these has a president; and a member of the first college is always president of the second.—The *geheimderath* represents the prince, and superintends the other two. The *regierung* regulates limits of territories, holds conferences with other princes, and is in most countries a court of justice: however, in some states there is also a court of justice called *justitz departement*. And besides the right of conferences assigned to the *regierung* by the sovereign when there are disputes between princes, there is also an *austrage*, or arbitration, appointed in order to decide them: Attention must be paid to this privilege of princes, who must be called on to appoint an *austrage* before resort be had to the Imperial tribunal, but to which there still lies an appeal from the judgment of the *austrage*. The *rentkammer* attends to the regulation of domains and estates, to the territorial revenues, and management of the taxes.

Every sovereign or prince is arbitrary in laws of policy, but not of revenue; for no new tax or impost can be laid on his country without the consent of the nobles and subjects. For this purpose, on the *land tag*, or day on which his subjects are to be convened, which is once in the period of four or five years, and at no other time can he assemble them, he calls toge-
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Germany. ther the nobles and commissaries or deputies of the towns of his dominions. The nobles usually attend in person, but may send representatives. To this assembly the prince proposes the taxes, &c. and a majority of voices disposes of the measures.

Villages, though considerable, send no deputies to this assembly; because they are either already represented by their respective lords, or because they rank too low, being in a state of vassalage when compared to towns: for their inhabitants must mend highways, and can be impressed as soldiers; from both of which inhabitants of towns are exempt.

On the land tag, the respective quotas also of each place are fixed, in order to discharge the princes contingent in case of an Imperial war.

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Military
force and
annual re-
venue.

There is no fixed standing army of the empire; but the various states furnish their quotas pursuant to the agreement of 1681, when called upon by the diet in case of war, viz.

	Foot.	Horse.
Upper Saxony	2707	1321
Lower Saxony	2707	1321
Westphalia	2707	1321
Upper Rhine	2853	491
Lower Rhine	2707	600
Burgundy	2707	1321
Franconia	1902	980
Austria	5507	2521
Bavaria	1494	800
Swabia	2707	1321

Total 27,998 11,997

The whole number of forces in the service of the several German princes have been stated at half a million; others calculate, that the ecclesiastical princes can furnish 74,500 men, the temporal princes 379,000, and the emperor 90,000, as head of the house of Austria. Total 543,500.

The revenue accruing to the emperor as such in time of peace, is very trifling, only about 20,000 crowns, being the contributions of a few imperial towns; but in case of war, extraordinary aids, called *Roman months*, laid on by the diet, are contributed by the different circles at the following rate for raising 1½ million of florins, viz.

	Florins.	Xtr.
Upper Saxony	156,360	15
Lower Saxony	156,360	15
Westphalia	156,360	15
Upper Rhine	101,411	30
Lower Rhine	105,654	5
Burgundy	156,360	15
Franconia	113,481	25
Austria	306,390	20
Bavaria	91,261	5
Swabia	156,360	15

Total 1,499,999 40

The actual revenue of all Germany has been calculated at nearly L. 18,000,000 sterling, or 100 million of dollars.

31
Produc-
tions and
commerce.

From the great extent of the empire, every variety of soil is to be met with; but it is upon the whole more fertile than otherwise. The middle parts are most productive in corn and cattle; the southern abound with excellent wines and fruits. The northern parts, from their coldness, are rather unfavourable to vege-

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tation; however, agriculture throughout improves exceedingly. Their mines, though early explored, still continue great sources of wealth. They produce, excepting tin, almost every mineral. Of quicksilver, one mine alone is computed to yield 50,000 pounds weight a-year. They furnish the finest sort of clay for porcelain, and have excellent and extensive salt-works.

From the central situation of Germany, its commerce with the rest of Europe is very extensive. Its minerals are decidedly the first native articles for trade; after which its medicinal waters, salt, hemp, flax, linen, silk, wines, fruits, corn, cattle, stuffs, cloths, timber, porcelain, wrought iron and steel, drugs, oil, and colours, are the principal. The artisans furnished by the revocation of the edict of Nantz, enable Germany no longer to stand in need of the wrought silks of other countries. Great commercial fairs still exist in Germany, and it is considered upon the whole that the balance of trade is in its favour.

With regard to the character of the ancient Germans, they are described to us by the Greek and Roman writers as resembling the Gauls; and differing from other nations by the largeness of their stature, ruddy complexion, blue eyes, and yellow bushy hair, haughty and threatening looks, strong constitutions, and being proof against hunger, cold, and all kinds of hardship.

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Character
of the an-
cient Ger-
mans.

Their native disposition displayed itself chiefly in their martial genius, and in their singular fidelity. The former of these they did indeed carry to such an excess as came little short of downright ferocity; but, as to the latter, they not only valued themselves highly upon it, but were greatly esteemed by other nations for it; inasmuch that Augustus, and several of his successors, committed the guard of their persons to them, and almost all other nations either courted their friendship and alliance, or hired them as auxiliaries: though it must be owned, at the same time, that their extreme love of liberty, and their hatred of tyranny and oppression, have often hurried them to treachery and murder, especially when they have thought themselves ill used by those who hired them; for in all such cases they were easily stirred up, and extremely vindictive. In other cases, Tacitus tells us, they were noble, magnanimous, and beneficent, without ambition to aggrandize their dominions, or invading those from whom they received no injury; rather choosing to employ their strength and valour defensively than offensively; to preserve their own, than to ravage their neighbours.

Their friendship and intercourse was rather a compound of honest bluntness and hospitality, than of wit, humour, or gallantry. All strangers were sure to meet with a kind reception from them to the utmost of their ability: even those who were not in a capacity to entertain them, made it a piece of duty to introduce them to those who could; and nothing was looked upon as more scandalous and detestable, than to refuse them either the one or the other. They do not seem, indeed, to have had a taste for grand and elegant entertainments; they affected in every thing, in their houses, furniture, diet, &c. rather plainness and simplicity, than sumptuousness and luxury. If they learned of the Romans and Gauls the use of money, it was rather because they found it more convenient than

many. than their ancient way of bartering one commodity for another; and then they preferred those ancient coins which had been stamped during the times of the Roman liberty, especially such as were either milled or cut in the rims, because they could not be so easily cheated in them as in some others, which were frequently nothing but copper or iron plated over with silver. This last metal they likewise preferred before gold, not because it made a greater show, but because it was more convenient for buying and selling: And as they became in time more feared by, or more useful to, the Romans; so they learned how to draw enough of it from them to supply their whole country, besides what flowed to them from other nations.

As they despised superfluities in other cases, so they did also in the connubial way: every man was contented with one wife, except some few of their nobles, who allowed themselves a plurality, more for show than pleasure; and both were so faithful to each other, and chaste, true, and disinterested, in their conjugal affections, that Tacitus prefers their manners in this respect to those of the Romans. The men sought not dowries from their wives, but bestowed them upon them. Their youth, in those cold climes, did not begin so soon to feel the warmth of love as they do in hotter ones: it was a common rule with them not to marry young; and those were most esteemed who continued longest in celibacy, because they looked upon it as an effectual means to make them grow tall and strong; and to marry, or be concerned with a woman, before they were full 20 years old, was accounted shameful wantonness. The women shared with their husbands not only the care of their family, and the education of their children, but even the hardships of war. They attended them in the field, cooked their victuals for them, dressed their wounds, stirred them up to fight manfully against their enemies, and sometimes have by their courage and bravery recovered a victory when it was upon the point of being snatched from them. In a word, they looked upon such constant attendance on them, not as a servitude, like the Roman dames, but as a duty and an honour. But what appears to have been still an harder fate upon the ancient German dames was, that their great Odin excluded all those from his *valhalla*, or paradise, who did not, by some violent death, follow their deceased husbands thither. Yet notwithstanding their having been anciently in such high repute for their wisdom and supposed spirit of prophecy, and their continuing such faithful and tender helpmates to their husbands, they sunk in time so low in their esteem, that, according to the old Saxon law, he that hurt or killed a woman was to pay but half the fine that he should have done if he had hurt or killed a man.

33
ir func- There is scarcely any one thing in which the Germans, though so nearly allied in most of their other customs to the Gauls, were yet more opposite to them than in their funerals. Those of the latter were performed with great pomp and profusion; those of the former were done with the same plainness and simplicity which they observed in all other things: the only grandeur they affected in them was, to burn the bodies of their great men with some peculiar kinds of wood; but when the funeral pile was neither adorned with the clothes

and other fine furniture of the deceased, nor perfumed with fragrant herbs and gums: each man's armour, that is, his sword, shield, and spear, were flung into it, and sometimes his riding horse. The Danes, indeed, flung into the funeral pile of a prince, gold, silver, and other precious things, which the chief mourners, who walked in a gloomy guise round the fire, exhorted the bystanders to fling liberally into it in honour of the deceased. They afterwards deposited their ashes in urns, like the Gauls, Romans, and other nations; as it plainly appears, from the vast numbers which have been dug up all over the country, as well as from the sundry dissertations which have been written upon them by several learned moderns of that nation. One thing we may observe, in general, that, whatever sacrifices they offered for their dead, whatever presents they made to them at their funerals, and whatever other superstitious rites they might perform at them, all was done in consequence of those excellent notions which their ancient religion had taught them, the immortality of the soul, and the bliss or misery of a future life.

It is impossible, indeed, as they did not commit any thing to writing till very lately, and as none of the ancient writers have given us any account of it, to guess how soon the belief of their great Odin, and his paradise, was received among them. It may, for aught we know, have been older than the times of Tacitus, and he have known nothing of it, by reason of their scrupulous care in concealing their religion from strangers: but as they conveyed their doctrines to posterity by songs and poems, and most of the northern poets tell us that they have drawn their intelligence from those very poems which were still preserved among them; we may rightly enough suppose, that whatever doctrines are contained in them, were formerly professed by the generality of the nation, especially since we find their ancient practice so exactly conformable to it. Thus, since the surest road to this paradise was to excel in martial deeds, and to die intrepidly in the field of battle; and since none were excluded from it but base cowards, and betrayers of their country; it is natural to think, that the signal and excessive bravery of the Germans flowed from this ancient belief of theirs: and, if their females were so brave and faithful, as not only to share with their husbands all the dangers and fatigues of war, but at length to follow them, by a voluntary death, into the other world; it can hardly be attributed to any thing else but a strong persuasion of their being admitted to live with them in that place of bliss. This belief, therefore, whether received originally from the old Celtes, or afterwards taught them by the since deified Odin, seems, from their general practice, to have been universally received by all the Germans, though they might differ one from another in their notions of that future life.

The notion of a future happiness obtained by martial exploits, especially by dying sword in hand, made them bewail the fate of those who lived to an old age, as dishonourable here, and hopeless hereafter: upon which account, they had a barbarous way of sending them into the other world, willing or not willing. And this custom lasted several ages after their receiving Christianity, especially among the Prussians and Veni-

Germany. quick death, not only their children, the sick, servants, &c. but even their parents, and sometimes themselves : and among the latter we have instances of this horrid parricide being practised even in the beginning of the 14th century. All that need be added is, that, if those persons, thus supposed to have lived long enough, either desired to be put to death, or at least seemed cheerfully to submit to what they knew they could not avoid, their exit was commonly preceded with a fast, and their funeral with a feast ; but if they endeavoured to shun it, as it sometimes happened, both ceremonies were performed with the deepest mourning. In the former, they rejoiced at their deliverance, and being admitted into bliss ; in the latter, they bewailed their cowardly excluding themselves from it. Much the same thing was done towards those wives who betrayed a backwardness to follow their dead husbands.

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Remark-
able for
drinking to
excess.

We must likewise observe, that, in these funerals, as well as in all their other feasts, they were famed for drinking to excess ; and one may say of them, above all the other descendants of the ancient Celtes, that their hospitality, banquets, &c. consisted much more in the quantity of strong liquors, than in the elegance of eating. Beer and strong mead, which were their natural drink, were looked upon as the chief promoters of health, strength, fertility, and bravery ; upon which account, they made no scruple to indulge themselves to the utmost in them, not only in their feasts, and especially before an engagement, but even in their common meals.

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Character
of the mo-
dern Ger-
mans.

The modern Germans in their persons are tall and strong built. The ladies have generally fine complexions ; and some of them, especially in Saxony, have all the delicacy of features and shape that are so bewitching in a certain island of Europe.

Both men and women affect rich dresses, which in fashion are the same as in France and England ; but the better sort of men are excessively fond of gold and silver lace, especially if they are in the army. The ladies at the principal courts differ not much in their dress from the French and English, only they are not so excessively fond of paint as the former. At some courts they appear in rich furs ; and all of them are loaded with jewels, if they can obtain them. The female part of the burghers families, in many German towns, dress in a very different manner, and some of them inconceivably fantastic, as may be seen in many prints published in books of Travels ; but in this respect they are gradually reforming, and many of them make quite a different appearance in their dress from what they did 30 or 40 years ago. As to the peasantry and labourers, they dress as in other parts of Europe, according to their employments, convenience, and opulence. In Westphalia, and most other parts of Germany, they sleep between two feather-beds, or rather the upper one of down, with sheets stitched to them, which by use becomes a very comfortable practice. The most unhappy part of the Germans are the tenants of little needy princes, who squeeze them to keep up their own grandeur ; but, in general, the circumstances of the common people are far preferable to those of the French.

The Germans are naturally a frank, honest, hospitable people, free from artifice and disguise. The higher orders are ridiculously proud of titles, ancestry,

and show. The Germans, in general, are thought to want animation, as their persons promise more vigour and activity than they commonly exert even in the field of battle. But when commanded by able generals, especially the Italians, such as Montecuculi and prince Eugene, they have done great things, both against the Turks and the French. The Imperial arms have seldom made any remarkable figure against either of those two nations, or against the Swedes or Spaniards, when commanded by German generals. This possibly might be owing to the arbitrary obstinacy of the court of Vienna ; for in the two last wars the Austrians exhibited prodigies of military valour and genius.

Industry, application, and perseverance, are the great characteristics of the German nation, especially the mechanical part of it. Their works of art would be incredible were they not visible, especially in watch and clock making, jewellery, turnery, sculpture, drawing, painting, and certain kinds of architecture. The Germans have been charged with intemperance in eating and drinking ; and perhaps not unjustly, owing to the vast plenty of their country in wine and provisions of every kind. But those practices seem now to be wearing out. At the greatest tables, though the guests drink pretty freely during dinner, yet the repast is commonly finished by coffee after three or four public toasts have been drank. But no people have more feasting at marriages, funerals, and birth-days.

The German nobility are generally men of so much honour, that a sharper in other countries, especially in England, meets with more credit if he pretends to be a German, than of any other nation.

The merchants and tradesmen are very civil and obliging. All the sons of noblemen inherit their fathers titles, which greatly perplexes the heralds and genealogists of that country. This perhaps is one of the reasons why the German husbands are not quite so complaisant as they ought otherwise to be to their ladies, who are not intitled to any pre-eminence at the table ; nor indeed do they seem to affect it, being far from either ambition or loquacity, though they are said to be somewhat too fond of gaming. From what has been premised, it may easily be conceived, that many of the German nobility, having no other hereditary estate than a high-sounding title, easily enter into their armies, and those of other sovereigns. Their fondness for title is attended with many other inconveniences. Their princes think that the cultivation of their lands, though it may treble their revenue, is below their attention ; and that, as they are a species of beings superior to labourers of every kind, they would demean themselves in being concerned in the improvement of their grounds.

The domestic diversions of the Germans are the same as in England ; billiards, cards, dice, fencing, dancing, and the like. In summer, people of fashion repair to places of public resort, and drink the waters. As to their field-diversions, besides their favourite one of hunting, they have bull and bear beating, and the like. The inhabitants of Vienna live luxuriously, a great part of their time being spent in feasting and carousing ; and in winter, when the several branches of the Danube are frozen over, and the ground covered with

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Amuse-
ments.

many with snow, the ladies take their recreations in sledges of different shapes, such as griffins, tygers, swans, scollop-shells, &c. Here the lady sits, dressed in velvet lined with rich furs, and adorned with laces and jewels, having on her head a velvet cap; and the sledge is drawn by one horse, stag, or other creature, set off with plumes of feathers, ribbons, and bells. As this diversion is taken chiefly in the nighttime, servants ride before the sledge with torches, and a gentleman sitting on the sledge behind guides the horse.

The Reformation first spread in Germany to most advantage; and since the religious peace of 1555, there have been established the Roman Catholic, prevailing mostly in the south; the Lutheran in the north; and the Calvinist, called also the *Reformed*, near the Rhine. Civil wars considerably deranged this settlement: it was, however, established by the celebrated peace of Westphalia, that the religion of the Seven States should remain as in 1624. The Romish superior clergy consist of 8 archbishops, 40 bishops, and many abbots. The Protestant clergy are governed by consistories under the sovereign of each state. The *Corpus Catholicorum* is under the direction of the archbishop, elector of Mentz; and the *Corpus Evangelicorum*, or Protestants, under the elector of Saxony; who have the care of the public concerns of their respective bodies.

Literature is at present in a very advanced state throughout almost all Germany, but particularly in the Protestant states. It is but about half a century since the German language has been purified and cultivated; since which various works of taste and elegance, as well as superior productions in the different walks of science, have appeared in it.—There are 38 universities in Germany; 19 Protestant, 17 Catholic, and 2 which partake of both; besides a number of literary societies and academic institutions: and education in general is particularly attended to even in the very lowest ranks.

GERMEN, the seed-bud; defined by Linnæus to be the base of the pistillum, which contains the rudiments of the seed; and, in progress of vegetation, swells and becomes the seed-vessel.

In assimilating the vegetable and animal kingdoms, Linnæus denominates the seed-bud the *ovarium* or *uterus* of plants; and affirms its existence to be chiefly at the time of the dispersion of the male-dust by the antheræ; as, after its impregnation, it becomes a seed-vessel. See BOTANY.

GERMEN, by Pliny and the ancient botanists, is used to signify a bud containing the rudiments of the leaves. See GEMMA.

GERMINATION, among botanists, comprehends the precise time which the seeds take to rise after they have been committed to the soil.—The different species of seeds are longer or shorter in rising according to the degree of heat which is proper to each. Millet, wheat, and several of the grasses, rise in one day; blite, spinach, beans, mustard, kidney-beans, turnips, and rocket, in three days; lettuce and dill, in four; cucumber, gourd, melon, and cress, in five; radish and beet, in six; barley, in seven; orach, in eight; purslane, in nine; cabbage, in ten; hyssop, in thirty; parsley, in forty or fifty days; peach, almond, walnut, chefnut,

pæony, horned-poppy, hypecoum, and ranunculus flaccatus, in one year; rose-bush, cornel-tree, hawthorn, medlar, and hazel-nut, in two. The seeds of some species of orchis, and of some liliaceous plants, never rise at all. Of seeds, some require to be sowed almost as soon as they are ripe, otherwise they will not sprout or germinate. Of this kind are the seeds of coffee and fraxinella. Others, particularly those of the pea-bloom flowers, preserve their germinating faculty for a series of years.—Mr Adanson asserts, that the sensitive plant retains that virtue for 30 or 40 years.

Air and water are the agents of germination. The humidity of the air alone makes several seeds to rise that are exposed to it. Seeds too are observed to rise in water, without the intervention of earth; but water without air is insufficient.—Mr Homberg's experiments on this head are decisive. He put several seeds under the exhausted receiver of an air-pump, with a view to establish something certain on the causes of germination. Some of them did not rise at all; and the greatest part of those which did, made very weak and feeble productions. Thus it is for want of air that seeds which are buried at a very great depth in the earth, either thrive but indifferently, or do not rise at all. They frequently preserve, however, their germinating virtue for many years within the bowels of the earth; and it is not unusual, upon a piece of ground being newly dug to a considerable depth, to observe it soon after covered with several plants, which had not been seen there in the memory of man. Were this precaution frequently repeated, it would doubtless be the means of recovering certain species of plants which are regarded as lost; or which perhaps, never coming to the knowledge of botanists, might hence appear the result of a new creation. Some seeds require a greater quantity of air than others. Thus purslane, which does not rise till after lettuce in the free air, rises before it *in vacuo*; and both prosper but little, or perish altogether, while cresses vegetate as freely as in the open air.

GERONTES, in antiquity, a kind of judges, or magistrates, in ancient Sparta, answering to what the Areopagites were at Athens. See AREOPAGUS.

The word is formed of the Greek γέρων, which signifies "old man." Whence also the words *geronic*, something belonging to an old man; and *Geronicon*, a famous book among the modern Greeks, containing the lives of the ancient monks. The senate of gerontes was called *gerusia*, that is, assembly or council of old men.

The gerontes were originally instituted by Lycurgus: their number, according to some, was 28; and, according to others, 32. They governed in conjunction with the king, whose authority they were intended to balance, and to watch over the interests of the people. Polybius defines their office in few words, when he says, *per ipsos, & cum ipsis omnia administrari*. None were to be admitted into this office under 60 years of age, and they held it for life. They were succeeded by the ephori.

GEROPOGON, in botany: A genus of the polygamia æqualis order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is paleaceous, with the points of the paleæ sharp or bristly; the calyx is simple; the seeds of the disc have a feathered pappus; those of the radius have a pappus of five awns.

Gerretz
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Gefner.

GERRETZ. See REMBRANDT.

GERVAISE, (or GERVASE), of Tilbury, a famous English writer of the 13th century; thus named from his being born at Tilbury on the Thames. He was nephew to Henry II. king of England; and was in great credit with Otho IV. emperor of Germany, to whom he dedicated a Description of the World, and a Chronicle. He also composed a History of England, that of the Holy Land, and other works.

GERUND, in grammar, a verbal noun of the neuter gender, partaking of the nature of a participle, declinable only in the singular number, through all the cases except the vocative; as nom. *amandum*, gen. *amandi*, dat. *amando*, accus. *amandum*, abl. *amando*. The word is formed of the Latin *gerundivus*, and that from the verb *gerere*, "to bear."

The *gerund*, expresses not only the *time*, but also the *manner*, of an action; as, "he fell in running post."—It differs from the participle, in that it expresses the *time*, which the participle does not; and from the tense properly so called, in that it expresses the *manner*, which the tense does not. See GRAMMAR.

GERUNDA, (anc. geog.), a town of the Aufetani, in the Hither Spain, on the south or right side of the river Sambroca. *Gerundenses*, the people. Now *Gironne* in Catalonia, on the Ter. E. Long. 2. 35. Lat. 42.

GESNER (Conrad), a celebrated physician and naturalist, was born at Zurich in 1516. Having finished his studies in France, he travelled into Italy, and taught medicine and philosophy in his own country with extraordinary reputation. He was acquainted with the languages; and excelled so much in natural history, that he was surnamed the *Pliny of Germany*. He died in 1564, leaving many works behind him; the principal of which are, 1. A history of animals, plants; and fossils; 2. *Bibliotheca Universalis*. A Greek and Latin lexicon. This author is by Boerhaave emphatically styled *Monstrum Eruditionis*, a prodigy of learning. Those indeed (as Mr Coxe observes in his Letters on Switzerland) "who are conversant with the works of this great scholar and naturalist, cannot repress their wonder and admiration at the amplitude of his knowledge in every species of erudition, and the variety of his discoveries in natural history, which was his peculiar delight. Their wonder and admiration is still further augmented, when they consider the gross ignorance of the age which he helped to enlighten, and the scanty succours he possessed to aid him in thus extending the bounds of knowledge; that he composed his works, and made those discoveries which would have done honour to the most enlightened period, under the complicated evils of poverty, sickness, and domestic uneasiness."

GESNER (Solomon), the celebrated author of the Death of Abel and many other admired works in the German language, was born at Zurich in the year 1730. In his early years he showed very few signs of superior abilities; and his progress in the rudiments of education was so slow, that his master gave him up as incapable of any greater attainments than writing and the four first rules of arithmetic. Upon this he was placed under a clergyman in the neighbourhood, a relation of his father's, and who showed himself better acquainted with the art of discovering the

natural inclinations of his pupils. This gentleman often carried young Gefner with him into the fields, where he made him observe the beauties of nature; and finding that he took great pleasure in such lessons, and seemed to listen to them with peculiar attention, he occasionally repeated some of the most striking passages of the ancient authors, who have written on these subjects, in the most agreeable and pleasing manner. By this ingenious artifice, the mind of young Gefner began to open, and its powers to expand; and it is, perhaps, owing to this circumstance, that he became so fond of the language of Virgil and Theocritus. When he arrived at a proper age to think of pursuing some line of business, Mr Gefner made choice of that of a bookseller, which was the profession of his father, and in some measure of his family. Of five houses at Zurich in the printing and bookselling business, two were occupied by Gefners: one belonged to two brothers of that name; and the other, that in which our poet had a share, was known by the firm of *Orel, Gefner, and Company*. It was known also by the extent of its correspondence, and by the choice and elegance of the works which it gave to the public.

Though Mr Gefner was a bookseller, he did not, however, damp his genius by submitting to the drudgery of business. He indulged himself freely in pursuing his favourite object, and his partners never envied him that time which he devoted to meditation and to study. In 1752, he made a tour through Germany, not so much for the purpose of extending his commerce, as to see and be acquainted with those authors who have done honour to their country. The following circumstance, which occurred during this tour, deserves to be mentioned, as it is strikingly characteristic of that timidity which often accompanies true genius. When Mr Gefner was at Berlin, he was admitted into a literary society, of which Gleim and Lessing were members. Each of the authors who composed it used to read in turn some piece of their own composition, and Mr Gefner was very desirous of submitting to these able critics a small work, which was his first attempt; but it was far from resembling those poets, whom Horace, and other satyrists have ridiculed, and who stun every one they meet by reciting their verses before them. As each of the members had done reading, Gefner was observed to move his hand with a kind of tremor towards his pocket, and to draw it back again without the manuscript which he ought to have produced. Having not as yet published anything, none of the company could guess the cause of a motion which his modesty prevented him from explaining. The work which he had not the courage to show, was his small poem, intitled *Night*, which he published on his return to Zurich in 1753. It was considered as an original, of which no model is to be found among the moderns; but in the opinion of the author, it was only a piece of imaginary painting, or, to use an expression of his own, in one of his letters to Mr Huber, who has translated his works, "A caricature composed in the moments of folly or intoxication." In this little poem he has introduced a short episode on the origin of the glow-worm, containing a poetical explanation of this natural phosphorus, which has all the beauty of Ovid's *Metamorphoses* without their prolixity.

Gefner.

lixity. The success of this essay emboldened the too timid muse of our young bookseller, and he published a pastoral romance, called *Daphnis*, in three cantos. The applause that was deservedly bestowed upon this performance induced the author to publish, some time after, his *Idylls* and some other rural poems in imitation of those of Theocritus. Pastoral poetry, which at this time was little known in Germany but by translations from foreign poets, began to find many partisans, and to be preferred to every other kind. Desirous, therefore, of tracing out a new path for himself, our poet thought that he could not do a more acceptable service to his countrymen, than to paint the felicity of innocence and rural life, and the tender emotions of love and gratitude. The only author worthy of notice who had preceded Mr Gefner in this career, was Mr Rost of Leipfick, whose pastoral poems appeared for the first time in 1744. This writer polished the language of the German shepherds; he had address enough to unite spirit and simplicity in a kind of writing which appears insipid without the former, and which becomes unnatural and disgusting if it is too abundant. He sometimes throws a delicate veil over those images which are deficient in decency, but it is to be regretted that it is often too slight. Such was the antagonist against whom Gefner had to contend. Our poet, however, pursued a different course. Instead of placing, like Rost, his scenes in modern times, he goes back with Theocritus to the golden age, that happy age which we are fond of reviewing when our passions are calm, and when freed from those anxious cares which hurry us beyond ourselves, we contemplate amidst tranquillity the beauties and fertility of the country. The characters of Gefner's *Idylls*, therefore, are taken from those societies which exist no longer but in the remembrance or rather the imagination. His shepherds are fathers, children, and husbands, who blush not at these titles so dear to nature, and to whom generosity, beneficence, and respect for the Deity, are sentiments no less familiar than love. These *Idylls* were the principal and favourite object of his pursuit, and that part of his works which acquired him the greatest reputation, especially among his countrymen. His death of Abel, which is well known, was published for the first time in 1758. It is written, like the rest of his pieces, in poetical prose; and was so much sought after, that it went through no less than three editions in the space of a year, without speaking of the spurious ones which appeared in Holland, at Berlin, and in France. The French edition was followed by several others. One came out in Italian; another in the Dutch language; a fourth in the Danish; and, lastly, two in English, one of them in prose and the other in verse. Among the pieces which Mr Gefner published after the Death of Abel, was his *First Navigator*, a poem in three cantos, which many people in Germany consider as his masterpiece. He made an attempt also in the pastoral drama, but not with the same success as in other kinds of rural poetry. He produced likewise, in the same style, *Evander* and *Alcimne*, in three acts; and *Erastus*, a small piece of one act, which was represented with some applause in several societies, both at Leipfick and Vienna.

But though poetry was Gefner's darling pursuit, and though he enriched the literature of his country

with works which will render his name immortal, he did not confine himself to one manner of imitating nature; he in turns took up the pencil and the pen, and his active genius equally directed them both. In his infancy he had received a few lessons in drawing, and he had afterwards pursued this study, but without any intention of becoming an artist. At the age of thirty, he felt that violent desire, which may be considered as the voice of genius; and this was in some measure excited by the sight of a beautiful collection formed by Mr Heidegger, whose daughter he had married. To please his father-in-law, he studied this treasure, composed principally of the best pieces of the Flemish school; and to this new taste he had almost sacrificed every other. Mr Gefner at first ventured only to delineate some decorations for the frontispieces of curious books printed in his office; but by little and little, he had the courage to make other attempts. In 1765, he published 10 landscapes etched and engraved by himself, and dedicated them to his friend Mr Watelet. Mr Gefner owed him this mark of respect for the care which he took to ornament with beautiful vignettes Mr Huber's translation of his *Idylls*. Twelve other pieces appeared in 1769; and after these attempts, Mr Gefner executed ornaments for many works which came from his presses, among which were his own works, a German translation of Swift, and several others.

Were we to judge from Mr Gefner's enthusiasm for his favourite pursuits, and from the time and attention which he bestowed upon them, we should be apt to conclude, that he found little leisure for discharging his duty as a citizen. The contrary, however, was the case, for he passed almost the half of his life in the first employments of the state. In 1765 he was called to the grand council, in 1767 to the lesser. In 1768 he was appointed bailiff of Eilibach, that of the four guards in 1776, and in 1781 superintendent of waters, which office in 1787 was continued to him for six years. In all these stations Mr Gefner discharged his duty with the most scrupulous fidelity; and died of a paralytical disorder, lamented by his countrymen and by those who had the pleasure of his acquaintance, on the 2d of March 1788, at the age of 56.

As a pastoral poet, Gefner undoubtedly is intitled to a very distinguished rank; and we may justly say, that if he has been equalled by any, he has been excelled by none. It is commonly believed, that pastoral poetry is very limited and confined; but those who read the works of Gefner will be convinced, that it is susceptible of much variety when treated of by the hand of a master. His pastoral romance of *Daphnis* is not inferior in natural simplicity to the celebrated work of Longus; but it surpasses it far in variety of images and incident. *Erastus* and *Evander* are instructive and interesting poems, on account of the contrast between the world and nature which reigns throughout them; and his *First Navigator* unites the mildest philosophy to all the splendor and imagery of fairy-land. If we analyse his dramatic poems, we shall find in them interesting fictions, characters well delineated, and situations replete with novelty. His language is that of the Graces, and the chastest ears might listen to the love which he has created. If he has sometimes the humour of Sterne and Fontaine, it is without their

Gefner.

Gesner
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Gesture.

licentiousness. The severest taste can find in his writings no lacuna to supply, no phrase deserving reprehension, nor could a more ingenious choice of expressions be substituted in the room of those which he has adopted.—Gesner's character, as a man, appears to be no less amiable. In whatever point of view we consider him, whether as a husband, a father, a friend, a magistrate, or a citizen, his virtues are equally conspicuous. He was naturally of a melancholy turn, but he was no enemy to rational and well-timed mirth; while the mildness and affability of his temper rendered his company always engaging, and endeared him to those who had the pleasure of his acquaintance. Possessed of that nobleness of sentiment, united with great modesty, which is the usual attendant of true genius, he was simple in his external appearance, as well as in his conversation. His language was lively and animated; but his reserve before strangers resembled timidity, and it was only in the presence of those with whom he was acquainted, that his real character appeared in its full lustre.

Mr Gesner's reputation and virtues were known even to the remotest parts of Europe. The empress of Russia Catharine II. presented him with a gold medal as a mark of her esteem. Strangers of all nations gave him no less flattering testimonies of their admiration; and travellers thought they had seen only the half of Switzerland, if they had not been in the company of Gesner, or procured some of his landscapes or drawings. In this last way he had acquired so much reputation, that he was ranked among the best artists of Germany; and Mr Fueslin, his countryman, who was himself a painter, in the preface to the third volume of the new edition which he published of his 'Historical essay on the painters, engravers, architects, and sculptors, who have done honour to Switzerland,' gives a distinguished place to Mr Gesner, though then living.

GESNERIA, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, *Perfonata*. The calyx is quinquefid, and placed on the germen; the corolla incurvated and then recurvated; the capsule inferior and bilocular.

GESSORIANUM (anc. geog.), a port and station for ships of the Morini in Belgica. In Cæsar's time, according to Dio, there was no town; but Florus speaks of it as one: and the Gessoriacenses Muri are mentioned by Eumenius in his Panegyric. The author of *Tabula Theodosiana*, commonly called *Peutinger's map*, says expressly, that Gessoriacum was in his time called *Bononia*. Now *Boulogne* in Picardy. E. Long. 1. 30. N. Lat. 50. 40.

GESTATION, among physicians. See **PREGNANCY**.

GESTRICIA, a province of Sweden, bounded by Helsingia on the north, by the Bothnic gulph on the east, by Upland on the south, and by Dalecarlia on the west.

GESTURE, a motion of the body, intended to signify some idea or passion of the mind. It consists principally in the action of the hands and face; and may be defined, a suitable conformity of the motions of the countenance, and of several parts of the body, in speaking to the subject matter of the discourse. See **DECLAMATION**, and **ORATORY**, n° 130, 131.

Geta
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Geum.

GETA (**SEPTIMIUS**), a son of the emperor Severus, brother to Caracalla. In the eighth year of his age, he was moved with compassion at the fate of some of the partizans of Niger and Albinus who were to be executed, and his father struck with his humanity retracted the sentence. After Severus's death, he reigned at Rome conjointly with his brother; but Caracalla, who envied his virtues and was jealous of his popularity, ordered him to be poisoned; and when this could not be effected, he murdered him in the arms of his mother Julia, who in the attempt of defending the fatal blows from his body received a wound in her arm, from the hand of her son, A. D. 212. Geta had not yet reached the 23d year of his age, and the Romans had reason to lament the death of so virtuous a prince, while they groaned under the cruelties and oppression of Caracalla.

GETHIN (Lady Grace), an English lady of uncommon parts, was the daughter of Sir George Norton of Abbots-Leigh in Somersetshire, and born in the year 1676. She had all the advantages of a liberal education; and became the wife of Sir Richard Gethin, of Gethin-Grott in Ireland. She was mistress of great accomplishments, natural and acquired, but did not live long enough to display them to the world; for she died in the 21st year of her age. She was buried in Westminster-abbey, where a beautiful monument with an inscription is erected over her; and, for perpetuating her memory, provision was made for a sermon to be preached in Westminster-abbey, yearly, on Ash-Wednesday for ever. She wrote, and left behind her, in loose papers, a work which, soon after her death, was methodized, and published under the title of "*Reliquiæ Gethinianæ*;" or, Some remains of the most ingenious and excellent lady, Grace lady Gethin, lately deceased. Being a collection of choice discourses, pleasant apophthegms, and witty sentences. Written by her, for the most part, by way of essay, and at spare hours." Lond. 1700, 4to; with her picture before it.

GETHSEMANE (anc. geog.), a village in the mount of Olives, whither Jesus Christ sometimes retreated in the night-time. It was in a garden belonging to this village that he suffered the agony in which he sweated drops of blood; and here he was arrested by Judas and the rest who were conducted by this traitor. The place is by Maundrel described as an even plot of ground, not above 57 yards square, lying between the foot of Mount Olivet and the brook Cedron.

GETHYLLIS, in botany: A genus of the monogynia order, belonging to the dodecandria class of plants; and in the natural method ranking under the ninth order, *Spathaceæ*. The corolla is six-cleft, and the stamina are in six different directions; the capsule is trilocular.

GEUM, **AVENS**, or *Herb-Bennet*: A genus of the polygamia order, belonging to the icofandria class of plants; and in the natural method ranking under the 35th order, *Senticosæ*. The calyx is cleft into ten parts; there are five petals, and each of the seeds has a jointed awn. There are five species; of which the most remarkable are, 1. The upbanum, with thick fibrous roots of an aromatic taste, rough, ferrated leaves, and upright, round, hairy stalks terminated by large yellow

Ghent,
ghost.

yellow flowers, succeeded by globular fruit. 2. The rivale, with a very thick, fleshy, and fibrous root, hairy leaves, and upright stalks, 10 or 12 inches high, terminated by purple flowers nodding on one side. Of this there are varieties with red and with yellow flowers.—Both these are natives of Britain, and are easily propagated either by the root or seed. The roots of the first, gathered in the spring before the stem comes up, and infused in ale, give it a pleasant flavour, and prevent its growing four. Infused in wine, they have a stomachic virtue. The taste is mildly austere and aromatic, especially when the plant grows in warm dry situations; but in moist shady places, it hath little virtue. Cows, goats, sheep, and swine, eat the plant; horses are not fond of it.—The powdered root of the second species will cure tertian agues, and is daily used for that purpose by the Canadians. Sheep and goats eat the plant; cows, horses, and swine, are not fond of it.

GHEENT, a city of the Austrian Netherlands, capital of the province of Flanders. It is seated on four navigable rivers, the Scheld, the Lys, the Lieve, and the Moere, which run through it, and divide it into canals. These form 26 little isles, over which there are 300 bridges: among which there is one remarkable for a statue of brass of a young man who was obliged to cut off his father's head; but as he was going to strike, the blade flew into the air, and the hilt remained in his hand, upon which they were both pardoned. There is a picture of the whole transaction in the town-house. Ghent is surrounded with walls and other fortifications, and is tolerably strong for a place of its circumference. But all the ground within the walls is not built upon. The streets are large and well paved, the market places spacious, and the houses built with brick. But the Friday's market-place is the largest, and is remarkable for the statue of Charles V. which stands upon a pedestal in the imperial habit. That of Cortere is remarkable for a fine walk under several rows of trees. In 1737 a fine opera-house was built here, and a guard-house for the garrison. Near the town is a very high tower, with a handsome clock and chimes. The great bell weighs 11,000 pounds.

This town is famous for the pacification signed here, in 1526, for settling the tranquillity of the Seventeen Provinces, which was afterwards confirmed by the king of Spain. It was taken by Louis XIV. in 1678, who afterwards restored it. The French took possession of it again after the death of Charles II. of Spain. In 1706, it was taken by the duke of Marlborough; and by the French in 1708; but it was retaken the same year. Last of all, the French took it by surprise after the battle of Fontenoy; but at the peace of Aix-la-Chapelle it was rendered back. This is the birth-place of John of Gaunt. It is very well seated for trade, on account of its rivers and canals. It carries on a great commerce in corn; and has linen, woollen, and silk manufactures. The number of inhabitants is about 70,000. E. Long. 4. 0. N. Lat. 51. 24.

GHOST, an apparition, or spirit of a person deceased.

The ancients supposed every man to be possessed of three different ghosts, which after the dissolution of the human body were differently disposed of. These three ghosts are distinguished by the names of *Manes*,

Spiritus, *Umbra*. The *manes*, they fancied, went down into the infernal regions; the *spiritus* ascended to the skies; and the *umbra* hovered about the tomb, as being unwilling to quit its old connections. Thus Dido (Virg. *Æn.* iv. 384.) threatens *Æneas* after death that she will haunt him with her *umbra*, whilst her *manes* rejoice in his torments below. This idea of a threefold soul is very clearly expressed in these lines, which have been attributed to Ovid.

Bis duo sunt homini: MANES, CARO, SPIRITUS, UMBRA:

Quatuor ista loci bis duo suscipiunt

Terra tegit CARNEM, tumulum circumvolat UMBRA,

Orcus habet MANES, SPIRITUS æira petit.

The most striking outlines of the popular superstitions respecting ghosts among us, are thus humorously collected by Captain Grose in his Provincial Glossary: "A ghost is supposed to be the spirit of a person deceased, who is either commissioned to return for some especial errand, such as the discovery of a murder, to procure restitution of lands or money unjustly withheld from an orphan or widow—or, having committed some injustice whilst living, cannot rest till that is redressed. Sometimes the occasion of spirits revisiting this world, is to inform their heir in what secret place, or private drawer in an old trunk, they had hidden the title-deeds of the estate; or where, in troublesome times, they buried their money or plate. Some ghosts of murdered persons, whose bodies have been secretly buried, cannot be at ease till their bones have been taken up, and deposited in consecrated ground with all the rites of Christian burial.

" Sometimes ghosts appear in consequence of an agreement made, whilst living, with some particular friend, that he who first died should appear to the survivor.

" Glanvil tells us of the ghost of a person who had lived but a disorderly kind of life, for which it was condemned to wander up and down the earth, in the company of evil spirits, till the day of judgment.

" In most of the relations of ghosts, they are supposed to be mere aerial beings, without substance, and that they can pass through walls and other solid bodies at pleasure. A particular instance of this is given, in relation the 27th, in Glanvil's collection, where one David Hunter, neat-herd to the bishop of Down and Connor, was for a long time haunted by the apparition of an old woman, whom he was by a secret impulse obliged to follow whenever she appeared, which he says he did for a considerable time, even if in bed with his wife: and because his wife could not hold him in his bed, she would go too, and walk after him till day, though she saw nothing; but his little dog was so well acquainted with the apparition, that he would follow it as well as his master. If a tree stood in her walk, he observed her always to go through it. Notwithstanding this seeming immateriality, this very ghost was not without some substance; for, having performed her errand, she desired Hunter to lift her from the ground; in the doing of which, he says, she felt just like a bag of feathers. We sometimes also read of ghosts striking violent blows; and that, if not made way for, they overturn all impediments, like a furious whirlwind. Glanvil mentions an instance of this, in relation 17th, of a Dutch lieutenant who had the faculty of seeing ghosts; and who, being prevented making

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Ghost. king way for one which he mentioned to some friends as coming towards them, was, with his companions, violently thrown down, and sorely bruised. We further learn, by relation 16th, that the hand of a ghost is 'as cold as a clod.'

"The usual time at which ghosts make their appearance is midnight, and seldom before it is dark; though some audacious spirits have been said to appear even by day-light: but of this there are few instances, and those mostly ghosts who have been laid, perhaps in the Red Sea (of which more hereafter), and whose times of confinement were expired: these, like felons confined to the lighters, are said to return more troublesome and daring than before. No ghosts can appear on Christmas eve; this Shakespeare has put into the mouth of one of his characters in Hamlet.

"Ghosts commonly appear in the same dress they usually wore whilst living, though they are sometimes clothed all in white; but that is chiefly the churchyard ghosts, who have no particular business, but seem to appear *pro bono publico*, or to scare drunken rustics from tumbling over their graves.

"I cannot learn that ghosts carry tapers in their hands, as they are sometimes depicted, though the room in which they appear, if without fire or candle, is frequently said to be as light as day. Dragging chains is not the fashion of English ghosts; chains and black vestments being chiefly the accoutrements of foreign spectres seen in arbitrary governments: dead or alive, English spirits are free. One instance, however, of an English ghost dressed in black, is found in the celebrated ballad of William and Margaret, in the following lines:

And clay-cold was her lily hand,
That held her *fable shroud*

"This, however, may be considered as a poetical licence, used in all likelihood for the sake of the opposition of *lily to fable*.

"If, during the time of an apparition, there is a lighted candle in the room, it will burn extremely blue: this is so universally acknowledged, that many eminent philosophers have busied themselves in accounting for it, without once doubting the truth of the fact. Dogs too have the faculty of seeing spirits, as is instanced in David Hunter's relation above quoted; but in that case they usually show signs of terror, by whining and creeping to their master for protection: and it is generally supposed that they often see things of this nature when their owner cannot; there being some persons, particularly those born on a Christmas eve, who cannot see spirits.

"The coming of a spirit is announced some time before its appearance, by a variety of loud and dreadful noises; sometimes rattling in the old hall like a coach and six, and rumbling up and down the staircase like the trundling of bowls or cannon balls. At length the door flies open, and the spectre stalks slowly up to the bed's foot, and opening the curtains, looks stedfastly at the person in bed by whom it is seen; a ghost being very rarely visible to more than one person, although there are several in company. It is here necessary to observe, that it has been universally found by experience, as well as affirmed by diverse apparitions themselves, that a ghost has not the power to speak till it has been first spoken to; so that, notwith-

N^o 138.

Ghost. standing the urgency of the business on which it may come, every thing must stand still till the person visited can find sufficient courage to speak to it: an event that sometimes does not take place for many years. It has not been found that female ghosts are more loquacious than those of the male sex, both being equally restrained by this law.

"The mode of addressing a ghost is by commanding it, in the name of the Three Persons of the Trinity, to tell you who it is, and what is its business: this it may be necessary to repeat three times; after which it will, in a low and hollow voice, declare its satisfaction at being spoken to, and desire the party addressing it not to be afraid, for it will do him no harm. This being premised, it commonly enters into its narrative; which being completed, and its request or commands given, with injunctions that they be immediately executed, it vanishes away, frequently in a flash of light; in which case, some ghosts have been so considerate as to desire the party to whom they appeared to shut their eyes: sometimes its departure is attended with delightful music. During the narration of its business, a ghost must by no means be interrupted by questions of any kind; so doing is extremely dangerous: if any doubts arise, they must be stated after the spirit has done its tale. Questions respecting its state, or the state of any of their former acquaintance, are offensive, and not often answered; spirits perhaps being restrained from divulging the secrets of their prison house. Occasionally spirits will even condescend to talk on common occurrences, as is instanced by Glanvil in the apparition of Major George Sydenham to Captain William Dyke, relation 10th, wherein the major reproved the captain for suffering a sword he had given him to grow rusty; saying, 'Captain, captain, this sword did not use to be kept after this manner when it was mine.' This attention to the state of arms, was a remnant of the major's professional duty when living.

"It is somewhat remarkable that ghosts do not go about their business like the persons of this world. In cases of murder, a ghost, instead of going to the next justice of the peace, and laying its information, or to the nearest relation of the person murdered, appears to some poor labourer who knows none of the parties, draws the curtains of some decrepit nurse or alms-woman, or hovers about the place where his body is deposited. The same circuitous mode is pursued with respect to redressing injured orphans or widows; when it seems as if the shortest and most certain way would be, to go to the person guilty of the injustice, and haunt him continually till he be terrified into a restitution. Nor are the pointing out lost writings generally managed in a more summary way; the ghost commonly applying to a third person, ignorant of the whole affair, and a stranger to all concerned. But it is presumptuous to scrutinize too far into these matters: ghosts have undoubtedly forms and customs peculiar to themselves.

"If, after the first appearance, the persons employed neglect, or are prevented from, performing the message or business committed to their management, the ghost appears continually to them, at first with a discontented, next an angry, and at length with a furious, countenance, threatening to tear them in pieces if the

matter

matter is not forthwith executed; sometimes terrifying them, as in Glanvil's relation 26th, by appearing in many formidable shapes, and sometimes even striking them a violent blow. Of blows given by ghosts there are many instances, and some wherein they have been followed with an incurable lameness.

"It should have been observed, that ghosts, in delivering their commissions, in order to ensure belief, communicate to the persons employed some secret, known only to the parties concerned and themselves, the relation of which always produces the effect intended. The business being completed, ghosts appear with a cheerful countenance, saying they shall now be at rest, and will never more disturb any one; and, thanking their agents, by way of reward communicate to them something relative to themselves, which they will never reveal.

"Sometimes ghosts appear, and disturb a house, without deigning to give any reason for so doing: with these, the shortest and only way is to exorcise, and eject them; or, as the vulgar term is, lay them. For this purpose there must be two or three clergymen, and the ceremony must be performed in Latin; a language that strikes the most audacious ghost with terror. A ghost may be laid for any term less than an 100 years, and in any place or body, full or empty; as, a solid oak—the pommel of a sword—a barrel of beer, if a yeoman or simple gentleman—or a pipe of wine, if an esquire or a justice. But of all places the most common, and what a ghost least likes, is the Red Sea; it being related, in many instances, that ghosts have most earnestly besought the exorcists not to confine them in that place. It is nevertheless considered as an indisputable fact, that there are an infinite number laid there, perhaps from its being a safer prison than any other nearer at hand; though neither history nor tradition gives us any instance of ghosts escaping or returning from this kind of transportation before their time.

"Another species of human apparition may be here noticed, though it does not come under the strict description of a ghost. These are the exact figures and resemblances of persons then living, often seen not only by their friends at a distance, but many times by themselves; of which there are several instances in Aubery's Miscellanies: one of Sir Richard Napier, a physician of London, who being on the road from Bedfordshire to visit a friend in Berkshire, saw at an inn his own apparition lying on his bed as a dead corpse; he nevertheless went forward, and died in a short time: another of Lady Diana Rich, daughter of the Earl of Holland, who met her own apparition walking in a garden at Kensington, and died a month after of the small-pox. These apparitions are called *fetiches*; in Cumberland, *swarths*; and in Scotland, *wraiths*: they most commonly appear to distant friends and relations, at the very instant preceding the death of the person whose figure they put on. Sometimes, as in the instances above mentioned, there is a greater interval between the appearance and death." For a philosophical inquiry into the subject of apparitions in general, see the article SPECTRE.

GIAGH, in chronology, a cycle of 12 years; in use among the Turks and Cathayans.

Each year of the giagh bears a name of some animal: the first that of a mouse; the second that of a

bullock; the third of a lynx or leopard; the fourth of a hare; the fifth of a crocodile; the sixth of a serpent; the seventh of a horse; the eighth of a sheep; the ninth of a monkey; the tenth of a hen; the eleventh of a dog; and the twelfth of a hog.

They also divide the day into 12 parts, which they call *giaghs*, and distinguish them by the name of some animals. Each giagh contains two of our hours, and is divided into eight kehs, as many as there are quarters in our hours.

GIALLOLINO, in natural history, a fine yellow pigment much used under the name of NAPLES YELLOW.

GIANT, a person of extraordinary bulk and stature.

The Romances of all ages have furnished us with so many extravagant accounts of giants of incredible bulk and strength, that the existence of such people is now generally disbelieved. It is commonly thought, that the stature of man hath been the same in all ages; and some have even pretended to *demonstrate* the impossibility of the existence of giants mathematically. Of these our countryman M^r Laurin hath been the most explicit. "In general (says he) it will easily appear, that the efforts tending to destroy the cohesion of beams arising from their own gravity only, increase in the quadruplicate ratio of their lengths; but that the opposite efforts tending to preserve their cohesion, increase only in the triplicate proportion of the same lengths. From which it follows, that the greater beams must be in greater danger of breaking than the lesser similar ones; and that though a lesser beam may be firm and secure, yet a greater similar one may be made so long, that it will necessarily break by its own weight. Hence Galileo justly concludes, that what appears very firm, and succeeds very well in models, may be very weak and infirm, or even fall to pieces by its own weight, when it comes to be executed in large dimensions according to the model. From the same principle he argues, that there are necessary limits in the operations of nature and art, which they cannot surpass in magnitude. Were trees of a very enormous size, their branches would fall by their own weight. Large animals have not strength in proportion to their size; and if there were any land-animals much larger than those we know, they could hardly move, and would be perpetually subject to the most dangerous accidents. As to the animals of the sea, indeed, the case is different; for the gravity of the water in a great measure sustains those animals; and in fact these are known sometimes to be vastly larger than the greatest land-animals. Nor does it avail against this doctrine to tell us, that bones have sometimes been found which were supposed to have belonged to giants of immense size; such as the skeletons mentioned by Strabo and Pliny, the former of which was 60 cubits high, and the latter 46: for naturalists have concluded on just grounds, that in some cases these bones had belonged to elephants; and that the larger ones were bones of whales, which had been brought to the places where they were found by the revolutions of nature that have happened in past times. Though it must be owned, that there appears no reason why there may not have been men who have exceeded by some feet in height the tallest we have seen."

It will easily be seen, that arguments of this kind

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can never be conclusive; because, along with an increase of stature in any animal, we must always suppose a proportional increase in the cohesion of the parts of its body. Large works sometimes fail when constructed on the plan of models, because the cohesion of the materials whereof the model is made, and of the large work, are the same; but a difference in this respect will produce a very remarkable difference in the ultimate result. Thus, suppose a model is made of fir-wood, the model may be firm and strong enough; but a large work made also of fir, when executed according to the plan of the model, may be so weak that it will fall to pieces with its own weight. If, however, we make use of iron for the large work instead of fir, the whole will be sufficiently strong, even though made exactly according to the plan of the model. The like may be said with regard to large and small animals. If we could find an animal whose bones exceeded in hardness and strength the bones of other animals as much as iron exceeds fir, such an animal might be of a monstrous size, and yet be exceedingly strong. In like manner, if we suppose the flesh and bones of a giant to be greatly superior in hardness and strength to the bones of other men, the great size of his body will be no objection at all to his strength. The whole of the matter therefore concerning the existence of giants must rest on the credibility of the accounts we have from those who pretend to have seen them, and not on any arguments drawn *à priori*.

In the scripture we are told of *giants*, who were produced from the marriages of the *sons of God* with the *daughters of men**. This passage indeed has been differently interpreted, so as to render it doubtful whether the word translated *giants* does there imply any extraordinary stature. In other parts of scripture, however, giants, with their dimensions, are mentioned in such a manner that we cannot possibly doubt; as in the case of Og king of Bashan, and Goliath. In a memoir read before the Academy of Sciences at Rouen, M. Le Cat gives the following account of giants that are said to have existed in different ages.

"Profane historians have given seven feet of height to Hercules their first hero; and in our days we have seen men eight feet high. The giant who was shown in Rouen in 1735, measured eight feet some inches. The emperor Maximin was of that size; Shenkius and Platerus, physicians of the last century, saw several of that stature; and Goropius saw a girl who was ten feet high.—The body of Orestes, according to the Greeks, was eleven feet and a half; the giant Gaibara, brought from Arabia to Rome under Claudius Cæsar, was near ten feet; and the bones of Secondilla and Pusio, keepers of the gardens of Sallust, were but six inches shorter. Funnam, a Scotoman, who lived in the time of Eugene II. king of Scotland, measured eleven feet and a half; and Jacob le Maire, in his voyage to the straits of Magellan, reports, that on the 17th of December 1615, they found at Port Desire several graves covered with stones; and having the curiosity to remove the stones, they discovered human skeletons of ten and eleven feet long. The chevalier Scory, in his voyage to the peak of Teneriffe, says, that they found in one of the sepulchre caverns of that mountain the head of a Guanche which had 80 teeth, and that the body was not less than 15 feet long. The

giant Ferragus, slain by Orlando nephew of Charlemagne, was 18 feet high. Rioland, a celebrated anatomist, who wrote in 1614, says, that some years before there was to be seen in the suburbs of St Germain the tomb of the giant Iforet, who was 20 feet high. In Rouen, in 1509, in digging in the ditches near the Dominicans, they found a stone tomb containing a skeleton whose skull held a bushel of corn, and whose shin-bone reached up to the girdle of the tallest man there, being about four feet long, and consequently the body must have been 17 or 18 feet high. Upon the tomb was a plate of copper, whereon was engraved, "In this tomb lies the noble and puissant lord, the chevalier Ricoñ de Vallemont, and his bones." Platerus, a famous physician, declares, that he saw at Lucerne the true human bones of a subject which must have been at least 19 feet high. Valence in Dauphiné boasts of possessing the bones of the giant Bucart, tyrant of the Vivarais, who was slain by an arrow by the count De Cabillon his vassal. The Dominicans had a part of the shin-bone, with the articulation of the knee, and his figure painted in fresco, with an inscription, showing that this giant was 22 feet and a half high, and that his bones were found in 1705, near the banks of the Morderi, a little river at the foot of the mountain of Crussol, upon which (tradition says) the giant dwelt.

"January 11. 1613, some masons digging near the ruins of a castle in Dauphiné, in a field which (by tradition) had long been called the *giant's field*, at the depth of 18 feet discovered a brick tomb 30 feet long, 12 feet wide, and 8 feet high; on which was a grey stone, with the words *Theutobochus Rex* cut thereon. When the tomb was opened, they found a human skeleton entire, 25 feet and a half long, 10 feet wide across the shoulders, and five feet deep from the breast-bone to the back. His teeth were about the size each of an ox's foot, and his shin-bone measured four feet.—Near Mazarino, in Sicily, in 1516, was found a giant 30 feet high; his head was the size of an hog's head, and each of his teeth weighed five ounces. Near Palermo, in the valley of Mazara, in Sicily, a skeleton of a giant 30 feet long was found, in the year 1548; and another of 33 feet high, in 1550; and many curious persons have preserved several of these gigantic bones.

"The Athenians found near their city two famous skeletons, one of 34 and the other of 36 feet high.

"At Totu, in Bohemia, in 758, was found a skeleton, the head of which could scarce be encompassed by the arms of two men together, and whose legs, which they still keep in the castle of that city, were 26 feet long. The skull of the giant found in Macedonia, September 1691, held 210 pounds of corn.

"The celebrated Sir Hans Sloane, who treated this matter very learnedly, does not doubt these facts; but thinks the bones were those of elephants, whales, or other enormous animals.

"Elephants bones may be shown for those of giants; but they can never impose on connoisseurs. Whales, which, by their immense bulk, are more proper to be substituted for the largest giants, have neither arms nor legs; and the head of that animal hath not the least resemblance to that of a man. If it be true, therefore, that a great number of the gigantic bones which we have mentioned have been seen by anatomists, and

by

* See *Ante-diluvians*, p. 66. col. 1.

by them have been reputed real human bones, the existence of giants is proved."

With regard to the credibility of all or any of these accounts, it is difficult to determine any thing. If, in any castle of Bohemia, the bones of a man's leg 26 feet in length are preserved, we have indeed a decisive proof of the existence of a giant, in comparison of whom most others would be but pigmies. Nor indeed could these bones be supposed to belong to an elephant; for an elephant itself would be but a dwarf in comparison of such an enormous monster. But if these bones were really kept in any part of Bohemia, it seems strange that they have not been frequently visited, and particular descriptions of them given by the learned who have travelled into that country. It is certain, however, that there have been nations of men considerably exceeding the common stature. Thus, all the Roman historians inform us, that the Gauls and Germans exceeded the Italians in size; and it appears that the Italians in those days were of much the same stature with the people of the present age. Among these northern nations, it is also probable, that there would be as great differences in stature as there are among the present race of men. If that can be allowed, we may easily believe that some of these barbarians might be called *giants*, without any great impropriety. Of this superiority of size, indeed, the historian Florus gives a notable instance in Teutobochus, above mentioned, king of the Teutones: who being defeated and taken prisoner by Marius, was carried in triumph before him at Rome, when his head reached above the trophies that were carried in the same procession.

But whether these accounts are credited or not, we are very certain, that the stature of the human body is by no means absolutely fixed. We are ourselves a kind of giants in comparison of the Laplander; nor are these the most diminutive people to be found upon the earth. The abbe la Chappe, in his journey into Siberia in order to observe the last transit of Venus, passed through a village inhabited by people called *Wotjacks*, neither men nor women of whom were above four feet high. The accounts of the Patagonians also, which cannot be entirely discredited, render it very probable, that somewhere in South America there is a race of people very considerably exceeding the common size of mankind, and consequently that we cannot altogether discredit the relations of giants handed down to us by ancient authors; though what degree of credit we ought to give them, is not easy to be determined. See *PATAGONIA*.

Rebel GIANTS, in ancient mythology, were the sons of Coelus and Terra. According to Hesiod, they sprang from the blood of the wound which Coelus received from his son Saturn, and Hyginus calls them sons of Tartarus and Terra. They are represented as men of uncommon stature, with strength proportioned to their gigantic size. Some of them, as Cottus, Briareus, and Gyges, had each 50 heads and 100 arms, and serpents instead of legs. They were of a terrible aspect, their hair hung loose about their shoulders, and their beard was suffered to grow unmolested. Pallene and its neighbourhood was the place of their residence. The defeat of the Titans, to whom they were nearly related, incensed them against Jupiter, and they all

conspired to dethrone him. Accordingly they reared Mount Ossa upon Pelion, and Olympus upon Ossa; and from thence attacked the gods with huge rocks, some of which fell into the sea and became islands, and others fell on the earth and formed mountains. Jupiter summoned a council of the gods; when being informed that it was necessary to obtain the assistance of some mortal, he by the advice of Pallas called up his son Hercules; and with the aid of this hero he exterminated the giants Enceladus, Polybotes, Alcyon, Porphyryon, the two sons of Alceus, Ephialtus, Othus, Eurytus, Clytius, Tythius, Pallas, Hippolitus, Agrius, Thoon, and Typhon, the last of whom it was more difficult to vanquish than all the others. Jupiter having thus gained a complete victory, cast the rebels down to Tartarus, where they were to receive the full punishment of their enormous crimes: according to the accounts of some of the poets, he buried them alive under Mount Etna and different islands.

GIANTS-Causeway, a vast collection of Basaltic pillars in the county of Antrim in Ireland. See the article *BASALTES*.

The principal or grand causeway (for there are several less considerable and scattered fragments of similar workmanship) consists of a most irregular arrangement of many hundred thousands of columns of a black kind of rock, hard as marble: almost all of them are of a pentagonal figure, but so closely and compactly situated on their sides, though perfectly distinct from top to bottom, that scarce any thing can be introduced between them. The columns are of an unequal height and breadth; some of the highest, visible above the surface of the strand, and at the foot of the impending angular precipice, may be about 20 feet; they do not exceed this height, at least none of the principal arrangement. How deep they are fixed in the strand, was never yet discovered. This grand arrangement extends nearly 200 yards, visible at low water; how far beyond is uncertain: from its declining appearance, however, at low water, it is probable it does not extend under water to a distance any thing equal to what is seen above. The breadth of the principal causeway, which runs out in one continued range of columns, is, in general, from 20 to 30 feet; at one place or two it may be nearly 40 for a few yards. In this account are excluded the broken and scattered pieces of the same kind of construction, that are detached from the sides of the grand causeway, as they do not appear to have ever been contiguous to the principal arrangement, though they have frequently been taken into the width; which has been the cause of such wild and dissimilar representations of this causeway, which different accounts have exhibited. The highest part of this causeway is the narrowest, at the very foot of the impending cliff from whence the whole projects, where, for four or five yards, it is not above ten or fifteen feet wide. The columns of this narrow part incline from a perpendicular a little to the westward, and form a slope on their tops, by the very unequal height of the columns on the two sides, by which an ascent is made at the foot of the cliff, from the head of one column to the next above, *gradatim*, to the top of the great causeway, which, at the distance of half a dozen yards from the cliff, obtains a perpendicular position, and lowering in its general height,

Giants-Causeway.

Giant-
Causeway.

height, widens to about 20 or between 20 and 30 feet, and for 100 yards nearly is always above water. The tops of the columns for this length being nearly of an equal height, they form a grand and singular parade, that may be easily walked on, rather inclining to the water's edge. But from high-water mark, as it is perpetually washed by the beating surges on every return of the tide, the platform lowers considerably, and becomes more and more uneven, so as not to be walked on but with the greatest care. At the distance of 150 yards from the cliff, it turns a little to the east for 20 or 30 yards, and then sinks into the sea. The figure of these columns is almost unexceptionably pentagonal, or composed of five sides; there are but very few of any other figure introduced: some few there are of three, four, and six sides, but the generality of them are five-sided, and the spectator must look very nicely to find any of a different construction: yet what is very extraordinary, and particularly curious, there are not two columns in ten thousand to be found, that either have their sides equal among themselves, or whose figures are alike. Nor is the composition of these columns or pillars less deserving the attention of the curious spectator. They are not of one solid stone in an upright position; but composed of several short lengths, curiously joined, not with flat surfaces, but articulated into each other like ball and socket, or like the joints in the vertebrae of some of the larger kind of fish, the one end at the joint having a cavity, into which the convex end of the opposite is exactly fitted. This is not visible, but by disjoining the two stones. The depth of the concavity or convexity is generally about three or four inches. And what is still farther remarkable of the joint, the convexity, and the correspondent concavity, is not conformed to the external angular figure of the column, but exactly round, and as large as the size or diameter of the column will admit; and consequently as the angles of these columns are in general extremely unequal, the circular edges of the joint are seldom coincident with more than two or three sides of the pentagonal, and from the edge of the circular part of the joint to the exterior sides and angles they are quite plain. It is still farther very remarkable, likewise, that the articulations of these joints are frequently inverted; in some the concavity is upwards, in others the reverse. This occasions that variety and mixture of concavities and convexities on the tops of the columns, which is observable throughout the platform of this causeway, yet without any discoverable design or regularity with respect to the number of either. The length also of these particular stones, from joint to joint, is various: in general, they are from 18 to 24 inches long; and, for the most part, longer toward the bottom of the columns than nearer the top, and the articulation of the joints something deeper. The size or diameter likewise of the columns is as different as their length and figure; in general, they are from 15 to 20 inches in diameter. There are really no traces of uniformity or design discovered throughout the whole combination, except in the form of the joint, which is invariably by an articulation of the convex into the concave of the piece next above or below it; nor are there any traces of a finishing in any part, either in height, length, or breadth, of this curious causeway. If there

is here and there a smooth top to any of the columns above water, there are others just by, of equal height, that are more or less convex or concave, which show them to have been joined to pieces that have been washed or by other means taken off. And undoubtedly those parts that are always above water have, from time to time, been made as even as might be; and the remaining surfaces of the joints must naturally have been worn smoother by the constant friction of weather and walking, than where the sea, at every tide, is beating upon it and continually removing some of the upper stones and exposing fresh joints. And farther, as these columns preserve their diameters from top to bottom, in all the exterior ones, which have two or three sides exposed to view, the same may with reason be inferred of the interior columns whose tops only are visible. Yet what is very extraordinary, and equally curious, in this phenomenon, is, that notwithstanding the universal dissimilitude of the columns, both as to their figure and diameter, and though perfectly distinct from top to bottom, yet is the whole arrangement so closely combined at all points, that hardly a knife can be introduced between them either on the sides or angles. And it is really a most curious piece of entertainment to examine the close contexture and nice insertion of such an infinite variety of angular figures as are exhibited on the surface of this grand parade. From the infinite dissimilarity of the figure of these columns, this will appear a most surprising circumstance to the curious spectator; and would incline him to believe it a work of human art, were it not, on the other hand, inconceivable that the wit or invention of man should construct and combine such an infinite number of columns, which should have a general apparent likeness, and yet be so universally dissimilar in their figure, as that, from the minutest examination, not two in ten or twenty thousand should be found, whose angles and sides are equal among themselves, or of the one column to those of the other. That it is the work of nature, there can be no doubt to an attentive spectator, who carefully surveys the general form and situation, with the infinitely various figuration of the several parts of this causeway. There are no traces of regularity or design in the outlines of this curious phenomenon; which, including the broken and detached pieces of the same kind of workmanship, are extremely scattered and confused, and, whatever they might originally, do not at present appear to have any connection with the grand or principal causeway, as to any supposable design or use in its first construction, and as little design can be inferred from the figure or situation of the several constituent parts. The whole exhibition is, indeed, extremely confused, dissimilar, and destitute of every appearance of use or design in its original construction. But what, beyond dispute, determines its original to have been from nature, is, that the very cliffs, at a great distance from the causeway, especially in the bay to the eastward, exhibit at many places the same kind of columns, figured and jointed in all respects like those of the grand causeway: some of them are seen near to the top of the cliff, which in general, in these bays to the east and west of the causeway, is near 300 feet in height; others again are seen about midway, and at different elevations from the strand. A very considerable

Giant
Causeway

Giant-
caufeway
1
Gibbous.

siderable exposure of them is seen in the very bottom of the bay to the eastward, near a hundred rods from the caufeway, where the earth has evidently fallen away from them upon the strand, and exhibits a most curious arrangement of many of these pentagonal columns, in a perpendicular position, supporting, in appearance, a cliff of different strata of earth, clay, rock, &c. to the height of 150 feet or more, above. Some of these columns are between 30 and 40 feet high, from the top of the sloping bank below them; and, being longest in the middle of the arrangement, shortening on either hand in view, they have obtained the appellation of *organs*, from a rude likeness in this particular to the exterior or frontal tubes of that instrument; and as there are few broken pieces on the strand near it, it is probable that the outside range of columns that now appears is really the original exterior line, to the seaward, of this collection. But how far they extend internally into the bowels of the incumbent cliff, is unknown. The very substance, indeed, of that part of the cliff which projects to a point, between the two bays on the east and west of the caufeway, seems composed of this kind of materials; for besides the many pieces that are seen on the sides of the cliff that circulate to the bottom of the bays, particularly the eastern side, there is, at the very point of the cliff, and just above the narrow and highest part of the caufeway, a long collection of them seen, whose heads or tops just appearing without the sloping bank, plainly show them to be in an oblique position, and about half-way between the perpendicular and horizontal. The heads of these, likewise, are of mixed surfaces, convex and concave, and the columns evidently appear to have been removed from their original upright, to their present inclining or oblique position, by the sinking or falling of the cliff.

GIBBET, or GIBET, a machine in manner of a gallows, whereon notorious criminals, after execution, are hung in irons or chains, as spectacles in *terrorem*. See GALLOWES.—The word in French, *gibet*, properly denotes what we call gallows: it is supposed to come originally from the Arabic *gibel*, “mount or elevation of ground;” by reason *gibets* are usually placed on hills or eminences.

GIBBOUS, a term in medicine, denoting any protuberance or convexity of the body, as a person hunched or hump backed.

Infants are much more subject to gibbosity than adults, and it oftener proceeds from external than internal causes. A fall, blow, or the like, frequently thus distorts the tender bones of infants. When it proceeds from an internal cause, it is generally from a relaxation of the ligaments that sustain the spine, or a caries of its vertebrae; though the spine may be inflected forward, and the vertebrae thrown out by a too strong and repeated action of the abdominal muscles. This, if not timely redressed, grows up and fixes as the bones harden, till in adults it is totally irretrievable: but when the disorder is recent, and the person young, there are hopes of a cure. The common method is by a machine of pasteboard, wood, or steel, which is made to press principally on the gibbous part; and this by long wearing may set all right. The surgeons, however, have a different instrument, which they call a *crofs*, much more efficacious, though not quite so

convenient in the wearing. By the use of this, the parts are always prevented from growing any worse, and are often cured. During the application of these assistances, the parts should be at times rubbed with hungary-water, spirit of lavender, or the like, and defended with a strengthening plaster.

GIBBOUS, in astronomy, a term used in reference to the enlightened parts of the moon, whilst she is moving from the first quarter to the full, and from the full to the last quarter: for all that time the dark part appears horned or falcated; and the light one hunched out, convex, or gibbous.

GIBEAH, a city in the tribe of Benjamin, lying north of Jerusalem about 20 or 30 furlongs, and built upon a hill as its name imports.—This city gave birth to Saul, the first king of Israel, for which reason it is frequently called Gibeah of Saul, or Gibeah the native country of Saul.

GIBELINS, or GIBELLINS, a famous faction in Italy, opposite to another called the GUELPHS.

Those two factions ravaged and laid waste Italy for a long series of years; so that the history of that country, for the space of two centuries, is no more than a detail of their mutual violences and slaughters. The Gibelins stood for the emperor against the pope: but concerning their origin and the reason of their names we have but a very obscure account. According to the generality of authors, they rose about the year 1240, upon the emperor Frederick II.'s being excommunicated by the pope Gregory IX. Other writers maintain, that the two factions arose ten years before, though still under the same pope and emperor. But the most probable opinion is that of Maimbourg, who says, that the two factions of Guelphs and Gibelins arose from a quarrel between two ancient and illustrious houses on the confines of Germany, that of the Henries of Gibeling, and that of the Guelphs of Adorf.

GIBEON, a city seated on an eminence about 40 furlongs from Jerusalem northward, and not far from the city of Gibeah. See GEBÄ.

This was the capital city of the Gibeonites, who took the advantage of Joshua's oath, and of that which the elders of Israel likewise swore to them, upon an artificial representation which they made of their belonging to a very remote country, and their desire of making an alliance with the Hebrews. Joshua (ix. 3, 4, & seq.) and the elders inconsiderately entered into a league with these people; but soon discovered their mistake. Upon this, sending for the Gibeonites, they reproached them with their fraud; and without revoking the promise which they had made to them, of giving them their lives, they condemned them to carry wood and water to the tabernacle of the Lord, as slaves and captives taken in war; in which state of servitude they remained till the ruin and entire dispersion of the Jewish nation.

The Gibeonites were descended from the Hivites, the old inhabitants of that country; and possessed four cities, whereof Gibeon was the capital. The cities were Cephira, Beeroth, Kirjathjearim, and Gibeon, Josh. ix. 17. These cities were afterwards given to the tribe of Benjamin, except Kirjathjearim, which fell to the tribe of Judah. The Gibeonites continued ever after subject to those burdens which Joshua had imposed on them, and were very faithful to the Israelites.

Gibbous
||
Gibeon.

GIBLETS.

Giblets,
Gibraltar.

GIBLETS, the offals or entrails of a goose; including the heart and liver, with the feet, gizzard, &c. The word is supposed to be formed of *goblets*; from the French *gobeau*, "mouthful."—Giblets make a considerable article in cookery: they boil giblets, stew giblets, make ragous of giblets, giblet-pies, &c.

GIBRALTAR, a famous promontory, or rather peninsula, of Spain, lying in N. Lat. 35. 50. W. Long. 5. 35. To the ancients it was known by the name of *Calpe*, and was also called one of the *Pillars of Hercules*; by the Arabians it is called *Gebel Tarek*, that is, "the mount of Tarek," from *Tarek*, the name of the Saracen general who conquered Spain in the beginning of the eighth century. The whole is an immense rock, rising perpendicularly about 440 yards, measuring from north to south about two English miles, but not above one in breadth from east to west.—The town lies along the bay on the west side of the mountain on a decline; by which, generally speaking, the rains pass through it, and keep it clean. The old town was considerably larger than the new, which at present consists of between 400 and 500 houses. Many of the streets are narrow and irregular: the buildings are of different materials; some of natural stone out of the quarries, some of a facitious or artificial stone, and a few of brick. The people are supplied with fresh provisions chiefly from the coast of Barbary, with fruit, roots, and vegetables of all sorts from thence, or from their own gardens. Besides what is properly called the town, there are several spacious and commodious public edifices erected; such as barracks for the soldiers, with apartments for their officers, magazines of different kinds, storehouses for provisions, &c. The inhabitants, exclusive of the British subjects dependent on the garrison, or who reside there from other motives, consist of some Spaniards, a few Portuguese, a considerable number of Genoese, and about as many Jews; making in the whole, according to Dr Campbell, between two and three thousand, without reckoning the garrison; though some make them much fewer. The town may be said to have two ports; the first lying to the north, and is proper only for small vessels; the other is very commodious for large vessels, and has a fine stone quay. The bay is very beautiful and spacious, being in breadth about five miles, and in length eight or nine, with several small rivers running into it. It is very advantageous to the place. There is no ground to be found in the middle of it at 100 fathoms depth, so that a squadron may lie there in great safety; the breezes from it are very refreshing; and it contributes likewise to the subsistence of the inhabitants, by supplying them with plenty of fish.

The strait of Gibraltar, through which the ocean passes into the Mediterranean, thereby dividing Europe from Africa, runs from west to east about 13 leagues. In this strait there are three remarkable promontories or capes on the Spanish side, and as many opposite to them on the Barbary side. The first of these, on the side of Spain, is cape Trefalgar, opposite to which is cape Spartel; and in the neighbourhood of this stood the fortress of Tangier, once in the possession of the British. The next on the Spanish side is Tarifa; and over against it lies Malabata, near the town of Alcafar, where the straits are about five leagues broad. Lastly, Gibraltar, facing the mountain of Abyla, near the

fortress and town of Ceuta, which make the eastern entry of the straits. Gibraltar

This important fortress seems to have been first particularly noticed as a place of consequence in the year 712. At that time the general of the caliph Al Walid landed with an army of 12,000 men on the isthmus between Mons Calpe and the continent; and that he might secure an intercourse with Africa, ordered a castle to be built on the face of that hill. Part of the building still remains; and, from an inscription discovered above the principal gate, appears to have been finished in 725. It continued in the possession of the Saracens till the beginning of the 14th century, when it was recovered by Ferdinand king of Castile. In 1333, however, it was obliged to surrender to the son of the emperor of Fez, who came to the assistance of the Moorish king of Granada. An attempt was made upon it in 1349 by Alonzo king of Castile; but when the fortress had been reduced to the last extremity, a pestilential fever broke out in the Spanish camp, which carried off the king himself, with great part of his army; after which the enterprise was abandoned.

The fortress continued in the possession of the Saracen descendants of the prince of Fez until the year 1410, when it was taken possession of by Joseph III. king of Granada. A design of attacking it was formed by Henry de Gusman in 1435; but the enterprise having miscarried through his imprudence, he was defeated and slain. However, it was at length taken after a gallant defence by his son John de Gusman in 1462; since which time it has remained in the hands of the Christians. In 1540, it was surprised and pillaged by Piali Hamet, one of Barbarossa's corsairs; but the pirates having fallen in with some Sicilian galleys, were by them defeated, and all either killed or taken.

In the reign of Charles V. the fortifications of Gibraltar were modernised, and such additions made as render them almost impregnable. It was taken by the English, however, in the reign of queen Anne, and since that time has remained in their possession; and probably will always do so, unless ceded by treaty, as it appears altogether impossible to reduce it by any force of artillery let it be ever so great. In the year 1704, in consequence of the resolution adopted by the court of Britain to assist the archduke Charles in his pretensions to the Spanish crown, Sir George Rooke was sent with a powerful fleet into the Mediterranean. His orders being limited, nothing of consequence was done for some time, until at last an attempt on Gibraltar was resolved upon; not so much on account of the importance of the conquest, as to prevent any reflections against the admiral for inactivity. On the 21st of July that year, 1800 troops were landed upon the isthmus under the command of the prince of Hesse Darmstadt; and on the refusal of the governor to surrender, preparations were made for attacking the place. Early in the morning of the 23d, a cannonade was begun from the fleet, and kept up so briskly, that in five or six hours the Spaniards were driven from many of their guns, especially at the new mole-head. The admiral perceiving, that by gaining this part of the fortification, the reduction of the rest would be facilitated, ordered out some armed boats to take possession of it. On their approach the Spaniards sprung a mine,

Fortress first erected by the Saracens.

Various revolutions.

Its fortifications improved and strengthened.

Taken by Sir George Rooke in 1704.

mine; which demolished part of the works, killed two lieutenants and 40 private soldiers, wounding about 60 more. Notwithstanding this disaster, the assailants kept possession of the work, and took a small bastion, now the eight-gun battery, half way between the mole and the town. On this the governor thought proper to capitulate, and the prince of Hesse took possession of the gates on the 24th. The garrison, consisting at most of 150 men, marched out with the honours of war; and the Spaniards who chose to remain were allowed the same privileges they had enjoyed under the reign of Charles II. The works were found very strong, and the place well provided with ammunition and military stores.

This conquest was achieved with the loss of about 60 killed and 216 wounded on the part of the English. The prince of Hesse remained governor; and 18 men of war were left at Lisbon under the command of Sir John Leake, to succour the garrison if there should be occasion. The loss of such an important fortress, however, having alarmed both the courts of Madrid and Paris, orders were sent to the marquis de Villadarias, a Spanish grandee, to lay siege to it, in which he was to be assisted by a naval force from Toulon. The prince immediately applied to Sir John Leake for assistance; but before the latter had time to comply with his request, a French fleet arrived, and debarked six battalions to the assistance of the Spaniards; after which they proceeded to the westward, leaving only six frigates in the bay. The trenches were opened on the 11th of October, about which time Sir John arrived with 20 sail of English and Dutch ships; but hearing that the French were about to attack him with a superior force, he judged it proper to return and refit. Having very prudently left orders at Lisbon to make preparations for this purpose in his absence, he was enabled to accomplish the work with such expedition, that on the 29th of the same month, he returned, and surprised in the bay three frigates, a fire-ship, two English prizes, a tartan, and a store-ship. After this exploit he landed some reinforcements, supplied the garrison with six months provision and ammunition; at the same time detaching on shore a body of 500 sailors to assist in repairing the breaches which had been made by the enemy's fire.

Thus the Spaniards were disappointed in their hopes of success from an attack which had been projected that very night, and for which purpose 200 boats had been collected. Still, however, they did not despair; and supposing that the garrison would be off their guard and secure on account of the vicinity of their fleet, they formed the rash design of attempting to surprise the place though the British admiral was still before it. In this mad attempt 500 volunteers associated, taking the sacrament never to return unless they accomplished their purpose. They were conducted by a goat-herd to the south side of the rock near the cave-guard, at that time called *the pass of locust-trees*. This they mounted, and lodged themselves the first night in the Cave of St Michael: the next they scaled Charles V.'s Wall; surprised and massacred the guard at Middle-hill; where afterwards, by ropes and ladders, several hundreds of the party designed to support them were hauled up; but being discovered, they

were attacked by a strong party of grenadiers, and all of them at last either killed or taken. These brave adventurers were to have been supported by a body of French troops, and some feints were proposed to draw off the attention of the garrison; but, through the disagreement of the commanding officers, these proposals were not put in execution, and thus the volunteers were left to their fate.

Notwithstanding these misfortunes the Spaniards still continued the siege, and fitted out a strong squadron from Cadiz, with a design to intercept the convoys of provisions which might be sent to the garrison; flattering themselves at the same time, that, on the arrival of their fleet, Sir John would be obliged to retire, and the garrison of consequence to surrender to their united attacks. They continued their fire therefore with additional fury, dismounted many of the cannon, and did essential injury to the works in several different places. The prince of Hesse, however, was by no means deficient in his endeavours to disappoint their expectations. As it was probable that an attempt might be made to storm the curtain, a cuvette was dug in the ditch, which was filled by the tide, and a double row of palisades placed parallel to the works. The chambers of the mine under the glacis were loaded, and all means taken to defeat such an attempt; but on a sudden the Spaniards seemed to have altered their design, and threatened an attack on the lines which the garrison had on the declivity of the hill to flank the glacis, and overlook their advanced works. While affairs remained in this situation, part of the succours they had long expected arrived in the bay, December 7. 1704, and in two days after, the remainder came in with near 2000 men, along with a proportionable quantity of ammunition and provisions. These had sailed from Cape Spartel under convoy of four frigates; but were in imminent danger of falling into the hands of the enemy, whose fleet they mistook for their own; however they escaped by the fortunate circumstance of being becalmed, so that they could not get up to them.

Sir John Leake having thus powerfully reinforced the garrison, thought his presence in the bay no longer necessary, and therefore set sail for Lisbon, where he arrived about the end of the year. In the beginning of January 1705 the Spaniards were reinforced by a considerable body of infantry, and on the 11th of the month made an attack on the extremity of the King's Lines, but were repulsed. The attack was renewed next day with 600 grenadiers, French and Walloons, supported by 1000 Spaniards under lieutenant-general Fuy. They disposed themselves in such a manner as showed an intention to storm a breach which had been made in the Round Tower at the extremity of the King's Lines, and another in the entrenchment on the hill. The retrenchment which covered the latter breach, with part of the entrenchment joining the precipice of the rock, was defended at night by a captain, three subalterns, and 90 men; but it was customary for the captain to withdraw, with two subalterns and 60 men, at day-break. The Round Tower was defended by 180 men, commanded by a lieutenant colonel. The marquis, by deserters from the garrison, had obtained intelligence of the strength of these posts, and planned his attack accordingly. The

Gibraltar.

8
They are
all killed or
taken.

9
The siege
still conti-
nued.

10
The garri-
son rein-
forced.

11
Vigorous
attack by
the Spa-
niards.

de-

Gibraltar. detachment for the upper breach mounted the rock at midnight, and concealed themselves in the cliffs until the captain had withdrawn; after which, advancing to the point of the entrenchment, they threw grenades on the subaltern and his party, so that they were obliged to leave the place. At the same time 300 men stormed the Round Tower, where lieutenant-colonel Bar made a vigorous defence, though the enemy, having passed the breach above, annoyed them on the flanks with great stones and grenades. Observing, however, the Spaniards marching down to cut off his retreat from the town, he retired; and, by getting over the parapet of the King's Lines, descended into the covered way, where the English guards were posted. Thus the garrison were alarmed; all the regiments were assembled at their proper posts; and captain Fisher endeavoured to stop the progress of the enemy with 17 men, but they were repulsed, and himself taken prisoner. At last, however, the Tower was retaken by lieutenant-colonel Moncal at the head of 400 or 500 men, after it had been in the possession of the enemy upwards of an hour.

12
They are
repulsed

13
The siege
carried on
with fresh
ardour.

14
The French
fleet disper-
sed by a
storm.

15
The siege
turned into
a blockade,
and at last
raised.

The garrison were now farther reinforced by six companies of Dutch troops and 200 English soldiers, together with some provisions and stores. The assailants, however, were still determined to go on. The marquis de Villadarias was superseded by the Marischal Tesse a Frenchman, with whom Admiral Pointis was desired to co-operate in blocking up the place. The Marischal therefore joined the army with four fresh battalions, besides eight companies which had been sent before; the ordnance, which had been greatly injured by constant use, was exchanged for others, and the works, as they then stood, put into the best repair. On the part of the English a reinforcement was ordered under the command of Sir Thomas Dilkes and Sir John Hardy, to join Admiral Leake at Lisbon; which junction being effected, the whole fleet, consisting of 28 English, 4 Dutch, and 8 Portuguese men of war, having on board two battalions of land forces, set sail from Lisbon. Happily for the besieged, however, the incessant rains and storms about this time had retarded the operations of the land-forces, and greatly distressed the fleet of the enemy. Eight ships of the latter were forced from their anchors by the strong westerly wind, and obliged to drive aloft. At this critical period Sir John Leake, with the allied fleet, entered the straits. On his approach the few remaining French ships put out to sea; and the British admiral discovering five sail making out of the bay, and a gun fired at them from the garrison, immediately gave chase. Three French men of war were taken, and the admiral's ship and another driven on shore, where they were burnt. The rest, on hearing the report of the guns, had made the best of their way to Toulon.

The garrison was now so well supplied, that Marischal Tesse withdrew his troops from the trenches, and formed a blockade, drawing an intrenchment across the isthmus to prevent the garrison from ravaging the country. The prince of Hesse remained for some time in the place, where he repaired the batteries, and made some additions to the fortifications; after which he

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joined the arch-duke Charles at Lisbon. As the latter, however, was resolved to try his fortune with the Earl of Peterborough in Valencia and Catalonia, the prince was sent back to Gibraltar to prepare part of the garrison for embarkation, and soon after was followed by the whole fleet. Major General Ramos was now appointed governor of Gibraltar, in which only two new battalions were left, as nothing was to be feared from the enemy. The new governor, however, brought with him 400 men for the greater security of the place; but soon resigned his government to Colonel Roger Elliot, during whose time Gibraltar was made a free port by a special order from the queen.

Colonel Elliot was succeeded by colonel Congreve before the year 1714, and he by Colonel Cotton a short time after. In 1720 the Spaniards seem to have threatened another attack. Ceuta, a Spanish fortress in Barbary, had been for many years besieged by the Moors; and a powerful armament, commanded by the marquis de Lada, was now assembled in Gibraltar-bay, under pretence of relieving the African fortress, but with a secret design of first surprising Gibraltar; for which purpose they had provided scaling ladders, &c. The armament, however, had not been fitted out with such secrecy, but that the British ministry had intelligence of it. On this they sent orders to colonel Kane, governor of Minorca, to embark with part of his garrison for Gibraltar under convoy of the fleet in the Mediterranean. On his arrival he found the place in a critical situation. The garrison consisted only of three weak battalions under major Hetherington, besides whom there was only one other field-officer, major Batteroux, in the place, and no more than 14 days provisions remaining. The posture of affairs, however, was altered by the arrival of colonel Kane with 500 men with provisions and ammunition; which reinforcement, together with the spirited behaviour of the British commodore, induced the Spanish commander to abandon his design, though he remained of opinion that the fortress might then have been carried by a general assault.

Notwithstanding this disappointment, the Spaniards continued to keep a watchful eye over Gibraltar; and, in the latter end of the year 1726, assembled an army in the neighbourhood of Algeiras, encamping, on the 20th of January following, on the plain below St Roch, and erecting a battery on the beach to protect their camp. Though admiral Hopson was then at anchor in the bay of Gibraltar, yet, as he had received no intelligence of the actual commencement of hostilities between Britain and Spain, he was obliged to allow the boats of the latter to pass with provisions, arms, and ammunition, between Algeiras and the camp, at the same time that colonel now brigadier Kane, who had been a second time sent from Minorca, lay under similar embarrassments. The operations of the Spaniards, however, seemed so evidently to tend towards an attack, that the governor thought proper to order such of that nation as were in the town to leave it, and to forbid their galleys to anchor under his guns (A).

The count de Las Torres commanded the Spanish forces

(A) At this time the fortifications of Gibraltar were considerably different from what they had been in 1705. Several

forces, amounting to near 20,000 men; and soon after forming his camp, he advanced within reach of the garrison. The brigadier then desired him to keep out of his reach, otherwise he should do his utmost to force him; but to this the Spanish commander replied, that, as the garrison could command no more than they had power to maintain, he should obey his Catholic majesty's orders, and inchoach as far as possible. Hostilities, however, were not commenced until the 10th of February 1727, when the Spaniards, having brought materials for batteries to the old wind-mill on the neutral ground, it was determined in a council of war, that the Spanish general had commenced hostilities by inchoaching so far on the liberties of the garrison. Still, however, the governor sent to the count to know the reason of breaking ground before the garrison; but received for answer, that "he was in his master's territories, and was not answerable to any other person for his conduct." On this the governor opened the batteries of the Old Mole and those of Willis upon the Spanish workmen; however, they persisted in carrying on their operations, and at night marched a party down to the Devil's Tower, where they immediately broke ground, and began a communication with their other works. The governor was now informed by some deserters, that the enemy were forming a mine in a cave under Willis's Battery, with a design to blow it up: but the plot being thus happily discovered, a party was immediately stationed to cut off the communication. On the 22d of February the Spaniards opened on the garrison with 17 pieces of cannon besides mortars; and the day following brigadier Kane left Gibraltar to send a reinforcement from Minorca. On the 3d of March the enemy opened a new battery of 22 guns on the Old Mole, and on the 8th another of 15 guns, bearing also upon the same Mole, the guns of which had annoyed the western flank of their approaches.

All this time the garrison had kept up a constant and well directed fire from the batteries which bore upon the works of the enemy; but the ordnance in general being old, were frequently bursting; by which they suffered more than from the fire of the besiegers. The latter were also greatly distressed by the fleet under admiral Hopson and Sir Charles Wager, who, since the beginning of the siege, had intercepted their home-bound ships, and at the same time greatly benefited the garrison by bringing the prizes into the bay. Finding the Spaniards, however, obstinately bent on their enterprise, they formed a design, on the second of April, to bombard Algeiras, from whence the besieged were supplied with various articles of ammunition; but the fleet happening to be becalmed, the design was afterwards unaccountably abandoned; and on the arrival of a reinforcement from Minorca, they failed to the westward, leaving the garrison to defend themselves the best way they could.

The enemy continued to augment their batteries, and erect new ones, until they amounted at last to 60 cannon besides mortars; and, on the 3d of May, the governor received intelligence that a general assault was

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intended; to repel which he took every proper precaution. The enemy, however, still added to their approaches, and considerable reinforcements were received by both parties. Hostilities, however, ceased on the 12th, when news arrived that the preliminaries of a general peace were signed; since which time to the year 1779 no farther attempts were made on Gibraltar. In the course of these two sieges the loss of the Spaniards was very considerable; that of 1705 costing them not less than 10,000 men, including those who died of sickness; and in that of 1727 their loss was computed at near 3000, besides casualties, which could not be ascertained. That of the garrison amounted in 1705 to 400; and in 1727 to 300; a very small number, considering that during the siege 70 cannon and 30 mortars burst on the batteries.

The hostile manifesto presented by the Spanish ambassador to the court of London at the commencement of the late war, was soon followed by an interruption of communication betwixt Spain and the fortress of Gibraltar. No direct intention of attacking or distressing it, however, was manifested till the 16th of July, when the port was completely blocked up by a squadron of two 74 gun ships, several frigates, galleys, &c. Ten days after they began to form a camp on the plain below St Roch, three miles from the fortress. The garrison at this time consisted of 5382 men, including officers, with a company of engineers and artificers; but the greatest expectations were formed from the abilities and valour of general Elliot the governor. As soon as the breaking off the communication with Spain indicated approaching hostilities, the governor took every precaution that could be suggested by military wisdom; but though informed of the rupture betwixt the two courts having actually taken place, and though he beheld the hostile operations of the enemy, no means were used to interrupt them till the 12th of September, when the batteries of Green's Lodge, Willis, and Queen Charlotte, were opened for a few hours, with a view to disturb the workmen.

From this time to the beginning of the year 1780 the enemy continued the blockade both by sea and land, but without doing any damage to the works or garrison; and it was not until the 12th of January that a single person was wounded. This happened to be a woman, who, passing near one of the houses, was slightly hurt by a shot from the enemy. In the mean time, however, the usual supplies of provisions being cut off, the garrison began to feel all the horrors of famine. All the necessaries of life were very scarce, and to be procured only at exorbitant prices. Veal, mutton, and beef, sold from half a crown to four shillings per pound; fresh pork from two to three shillings; salted beef and pork fifteen pence; fowls eighteen shillings per couple; ducks a guinea; fire-wood, five shillings per hundred weight; a pint of milk and water fifteen pence; a small cabbage cost five shillings, and a small bunch of outer leaves five pence; Irish butter half a crown per pound; candles as much; and eggs sixpence each. As the rock, however, is almost sur-

4 Z

rounded

Several works were erected on the heights above the lines called *Willis's Batteries*; the Prince's Lines were extended to the extremity of the rock, and an inundation was formed out of the morass in front of the grand battery.

Gibraltar. rounded by the sea, it was natural to suppose, that in such a scarcity of other provisions great benefit would have been derived from the ocean; but the fishermen, being all foreigners, and under no regulation, took advantage of the present scarcity of provisions in the garrison to exact a most exorbitant price for the fish they supplied.

25
The Spanish fleet defeated and their admiral taken by Rodney.

Had matters remained long in this state, it is plain that the fortress, however strong, must have fallen into the hands of the enemy. They were, however, effectually relieved in consequence of the victory gained by admiral Rodney over the Spanish fleet commanded by Don Juan de Langara. The former had been furnished with a strong squadron, in order to relieve this important fortress; with which having set sail, he in a few days fell in with a Spanish fleet of 16 transports bound from Bilboa to Cadiz, and laden with provisions and naval stores, conveyed by a man of war of 64 guns, four frigates, and two armed vessels. Of these only a single transport escaped, the rest being all captured on the 8th of January 1780; and the loss of them, at the same time that it promised to be very serviceable to the garrison, was equally detrimental to the enemy, who were now in great want both of provisions and materials for their shipping.

This advantage was soon after followed by a much greater. On the 16th of the same month a Spanish squadron of 11 sail of the line was discovered off Cape St Vincent; and the British admiral having taken the proper methods to come up with them as quickly as possible, an engagement took place about four in the afternoon. At this time the headmost ships of the British line closed in with the nearest of the enemy, and in half an hour one of the Spaniards, mounting 70 guns, and having on board 600 men, blew up, and all on board perished. In two hours more another Spanish ship of the line was taken; notwithstanding which the fight continued with great vigour till two in the morning, when the headmost ship of the enemy struck to the Sandwich; after which the firing ceased. The weather throughout the night was so tempestuous that it was with the utmost difficulty the British could take possession of those ships which surrendered. These were six in number, but two of them drove ashore and were lost, only four being brought safe into Gibraltar. These were the admiral's ship of 80 guns and 700 men, with three others of 70 guns and 600 men. The engagement, however, happened so near the shore, and the British were so eager in securing the lee-gage to prevent the enemy's escape, that Admiral Rodney's ship, together with some of the largest in the fleet, were in great danger of running on the shoals of St Lucar; nor could they be got into deep water again without much labour and the exertion of great naval skill. It was the opinion of all who were present in the action, that had this engagement happened in the day-time, or had the weather been less boisterous, not one of the Spanish ships could have escaped; and even as it was, those which got off were so essentially damaged as to be unfit for service.

26
The garrison relieved and reinforced.

The news of this important victory arrived at Gibraltar on the evening of the day after it was fought; and in two days more the garrison was completely relieved by the arrival of the fleet and convoy, at the same time that they were farther reinforced by a regiment

of Highlanders, consisting of 1051 men, officers included. An opportunity was also taken of sending away with the fleet all the invalids and women in the garrison; with whom they set sail on the 10th of February, leaving in the bay only the Edgar and Panther ships of the line, with two frigates.

On the departure of the British fleet the blockade was immediately resumed; and notwithstanding the ample supplies lately received, the garrison soon began again to experience the inconveniency of wanting fresh provisions. It had hitherto received these in abundance from the coast of Barbary; but an unaccountable alteration had now taken place, so that the friendship of the emperor of Morocco was transferred from Great Britain to Spain in a manner totally unprecedented. His partiality towards the latter was the more surprising, as Britain had given no provocation, and the enmity between Spain and Morocco seemed to be in a manner constitutional, and founded upon such causes as could never cease to operate. Thus, however, the garrison became daily more and more distressed, from being obliged to make constant use of their salt provisions, and even this with the strictest economy. The industry and resolution of the British seamen and officers, indeed, sometimes overcame all obstacles, so that they found means to procure the necessary refreshments; though in so doing they were certainly exposed to the utmost danger from the enemy. At the same time the defence of the garrison was so vigorous, that while it continued to be supplied even in this scanty manner, the Spaniards began to lose all hope of reducing it; for which reason they formed a project of burning all the British shipping in the bay. The night appointed for putting this scheme in execution was the 6th of June 1780, when ten fire-ships, favoured by an uncommon darkness, stood over from the Spanish to the British side of the bay. Their design was to set fire to the storehouses nearest to the water side, as well as to the shipping there; but having been too precipitate in firing their ships, and being received also by a very heavy cannonade, the attempt was frustrated. On this occasion the skill and intrepidity of the British seamen was eminently displayed. Having manned their boats, they grappled the fireships already in flames; and, notwithstanding their dreadful appearance and the danger of their exploding, towed them clear of the vessels under the walls, and extinguished them.

The failure of this project was a grievous disappointment to Don Barcelo the Spanish admiral, who lay ready with his squadron to intercept the British vessels that might attempt to escape; at the same time that the batteries on their lines were in readiness to bombard the town, if the fire-ships had succeeded in causing any conflagration on shore. The failure of the present attempt, however, was soon followed by other disasters. As soon as they had, with great labour, pushed forward their new works, and constructed new batteries, they were certainly destroyed by the besieged; and their mortification on these occasions was the greater, as it was usual for the governor to allow them to complete their works before he commenced his destructive operations. Thus the labour of many days was often lost in a few hours, and afterwards was to be resumed with as little prospect of success as before.

Gibraltar. 27 The garrison again reduced. 28 Unsuccessful attempt to burn British shipping. 29 Spanish works destroyed.

fore. The garrison were now considerably annoyed by the Spanish gun-boats, to which indeed the shipping were equally exposed with themselves. These were vessels from 30 to 40 tons burden, constructed so that they lay low in the water, which rendered them difficult to be aimed at. They had 15 oars on a side, carried 40 or 50 men, with a 26 pounder on the prow; and, from the facility of managing them, two were deemed, in calm weather, to be a match for a frigate of moderate size. All their efforts, however, could still do no more than to reduce the garrison to great straits for want of provisions; and to this dreadful inconvenience the British submitted with the greatest cheerfulness. From the time of Admiral Rodney's departure in the month of February 1780 to the month of October, almost the only provisions in the garrison were such as tended to produce the scurvy; which accordingly raged in such a manner as to threaten the most fatal consequences. An antidote, however, was happily procured by the capture of a Danish dogger from Malaga laden with lemons and oranges, which the governor immediately purchased for the use of the garrison, and distributed among them. "At this time (says Captain Drinkwater) the scurvy had made dreadful ravages in our hospitals, and more were daily confined; many, however, unwilling to yield to its first attacks, persevered in their duty to the more advanced stages. It was therefore not uncommon, at this period, to see men, who, some months before, were hale, and capable of enduring any fatigue, supporting themselves to their posts upon crutches, and even with that assistance scarcely able to move along. The most fatal consequences in short were to be apprehended to the garrison from this terrible disorder, when this Dane was happily directed to our relief."

According to Mr Cairncroft, an eminent surgeon, who was present during this siege, "the scurvy, which now raged in Gibraltar, differed in no respect from that disease usually contracted by sailors in long sea-voyages; and of which the immediate cause seemed to be the subsisting for a length of time upon salted provisions only, without a sufficient quantity of vegetables or other acceffent foods. The circumstances related in the voyage of that celebrated circumnavigator Lord Anson, of consolidated fractures disuniting, and the callosity of the bone being perfectly dissolved, occurred frequently in our hospitals, and old sores and wounds opened anew from the nature of the disorder. Various antiscorbutics were used without success, such as acid of vitriol, four crout, extract of malt, essence of spruce, &c.; but the only specifics were fresh lemons and oranges given liberally; or, when they could not be procured, the preserved juice in such quantities, from one to four ounces per day, as the patient could bear. Whilst the lemons were found, from one to three were administered each day as circumstances directed. The juice given to those in the most malignant state was sometimes diluted with sugar, wine, or spirits; but the convalescents took it without dilution. Women and children were equally affected, nor were the officers exempted from this dreadful disorder. It became almost general at the commencement of the winter season, owing to the cold and moisture; and in the beginning of spring when vegetables were scarce. The juice was preserved by adding to 60 gallons of

expressed liquor about five or ten gallons of brandy, which kept it in so wholesome a state, that several casks were opened in good condition at the close of the siege. The old juice, however, was not so speedily efficacious as the fruit, though by persevering longer in its use it seldom failed."

Till this month the allowance of salt provisions had continued undiminished; but now it was judged necessary to reduce the allowance of bread and meat, and to make some other regulations in order to enforce the strictest economy with regard to food. Every thing of this kind that could be practised, however, seemed insufficient to preserve the garrison from absolute want. In the beginning of the year 1781 provisions became exceedingly scarce, by reason of the almost total expenditure of what was contained in the public stores, and the vigilance of the enemy's cruisers. About the middle of February the town bakers left off work for want of flour; and many of the poorer sort wanted bread. The price of fresh provisions again rose to a most enormous height. Small pigs sold at two guineas; turkeys at three; geese at 30 shillings; fowls and ducks at 10 shillings; damaged biscuit a shilling the pound; pease 18d.; and all other necessaries in proportion; at the same time the scarcity of fuel was such, that it was sometimes scarcely procurable in quantity sufficient to dress the victuals.

The garrison had hitherto derived assistance occasionally from the gardens on the neutral ground, though vast quantities of vegetables had been removed thence by the enemy. Towards the end of the month of October 1780, however, the Spaniards determined to expel the British from the gardens entirely; and this they accomplished in spite of all that could be done to prevent them. From this time the resources with regard to vegetables depended entirely upon the attention paid to cultivation; which, happily for the garrison, was attended with such success, especially during the winter months, that the produce came at last to be nearly equal to the demands. At last, on the 12th of April 1781, supplies were brought by the British fleet under admirals Darby, Digby, and Ross, though they could not be got in without great difficulty. The gun-boats already mentioned were now much increased in number and strength of construction; infesting the bay in such a manner as greatly to interrupt the debarkation of the stores. As no vessels of the same kind had been prepared to oppose them, they could scarce be prevented from effecting their purpose of burning the store-ships. With this view they had approached them every morning in hazy weather to the number of between 20 and 30, several of them carrying mortar-pieces; and as they used both sails and oars, they eluded all pursuit, by withdrawing on the rise of any breeze. To keep off these troublesome guests several stout frigates were obliged to station themselves along the bay for the protection of the shipping; but even this did not prevent them from continuing their molestation; and notwithstanding the vigilance and activity of the British sailors, it was seldom that they could come near enough to do them any damage. In spite of all their endeavours, however, the garrison was effectually relieved; an exploit which so exceedingly irritated the court of Spain, that they determined to exert the utmost force of the kingdom rather than fail

Gibraltar.

34
The garrison distressed for want of provisions.

35
The garrison entirely deprived of the use of the neutral ground.

36
Supplied by the British fleet.

37
The Spaniards resolve to exert themselves to the utmost.

Gibraltar. in the execution of their favourite project. The works before the town were therefore carried on with more vigour than ever, and the most tremendous preparations made to cause the obstinate garrison feel the resentment of an exasperated enemy. Their batteries were now mounted with guns of the heaviest metal, and with mortar-pieces of the largest size; the number of the former augmented to near 200, and of the latter to upwards of 80. For three weeks this prodigious artillery continued to pour forth an almost incessant shower of shot and shells, inasmuch that, in the time just mentioned, they had consumed 100,000 lb. of gunpowder, and thrown into the town four or five thousand shot or shells every 24 hours.

38
The town
entirely de-
stroyed.

By such an immense bombardment the town was almost totally laid in ruins. The inhabitants, computed at more than 3000 in number, experienced every difficulty that could arise from the destruction of their habitations: several of them were killed, and all forced to leave the town, and take shelter under tents with what accommodation could be provided for them in such scenes of horror and confusion. Numbers took the opportunity of retiring with the fleet; while many that remained were now reduced from a state of opulence to the greatest distress. The conduct of Governor Elliot was very humane and compassionate to such

as were obliged to stay; allowing them a free passage to England, and supplying them with provisions for the voyage.

During this bombardment, not only the greatest part of the effects belonging to the inhabitants were destroyed, but the fortifications were in many places greatly injured; and the worst was, that the remainder were destroyed by the soldiers, who had arrived at such a pitch of licentiousness, that they neither regarded nor would obey their officers. They were incited to this destructive scheme by the avarice of some of the inhabitants who had hoarded up and concealed a quantity of necessary articles, in order to procure an advanced price. They now, therefore, kept no bounds in dissipation, waste, and extravagance; a remarkable instance of which is given by Captain Drinkwater, in their roasting a pig by a fire made of cinnamon. To put a stop to these atrocious proceedings, rigorous measures were of necessity adopted; and it was intimated, that any soldier convicted of being drunk or asleep upon his post, or found marauding, should be immediately executed. The loss of human lives during this dreadful bombardment was less than could have been expected; but many remarkable circumstances are taken notice of by Captain Drinkwater, some of which are related in the note (A).

39
Disorderly
behaviour
of the sol-
diers.

(B) Two boys belonging to the artificer company were endowed with such wonderful strength of vision, that they could see the shot of the enemy in the air almost as soon as it came from the mouth of the gun; and were therefore constantly placed upon some part of the works to give notice to the soldiers of the approaching danger. During the time of the hottest fire, however, the men were so habituated to the fall of shells and shot around them, that they contracted an insensibility of danger, and almost required to be cautioned by their officers to avoid the explosion of a shell when lying with the fusee burning at their feet. In consequence of this inattention, they frequently neglected the advice of the boys above mentioned, and their neglect could not but be productive of fatal effects. An instance of this happened on the Princess Amelia's battery, where a shot thus disregarded came through one of the capped embrasures, carried off one of the legs from three soldiers, and wounded a fourth in both. In other cases, in which the persons themselves have observed the shot or shells coming towards them, they have been fascinated by its appearance, and unable to move from the spot, as small birds are said to be by the rattle-snake. "This sudden arrest of the faculties (says our author) was nothing uncommon: several instances occurred to my own observation, where men, totally free, have had their senses so engaged by a shell in its descent, that though sensible of their danger, even so far as to cry for assistance, they have been immovably fixed to the place. But what is more remarkable, these men have so instantaneously recovered themselves on its fall to the ground, as to remove to a place of safety before the shell burst." In this manner Lieutenant Lowe of the 14th regiment was fascinated by a shot which he saw coming, but had not power to remove from the place before it fell upon him and took off his leg.

Where these shells burst they produced instant and certain destruction, mangling in the most dreadful manner. The following are some instances. A matross had the misfortune of breaking his thigh by some accident; and being a man of great spirit, could scarce bear the confinement necessary for its reunion. In consequence of this he went abroad too soon, and thus unfortunately broke the bone a second time. Being now confined to bed, a shell happened to fall into the room where he was, and, rebounding, lodged itself directly upon him. The convalecents and sick instantly summoned all their strength, and crawled out of the room, while the poor matross lay below the shell, kept down by its weight, and utterly unable to stir. In a few seconds it burst, and took off both his legs, and scorched him in a dreadful manner. He survived the explosion, was sensible to the last moment, and died regretting that he had not been killed on the batteries. The case of a soldier of the 73d regiment shows that even in the most dangerous cases we should never despair of recovery while life remains. This unfortunate man had been knocked down by the wind of a shell, which, instantly bursting, killed his companion, and mangled himself in a shocking manner. His skull was dreadfully fractured, his left arm broken in two places, one of his legs shattered, the skin and muscles torn off from part of his right hand, the middle finger broken to pieces, and his whole body most severely bruised and marked with gunpowder. He presented so horrid an object to the surgeons, that they had not the least hopes of saving his life, and were at a loss what part to attend to first. He was that evening trepanned; a few days afterwards his leg was amputated, and other wounds and fractures were dressed. Being possessed of a most excellent constitution, nature performed wonders in his favour, and in 11 weeks his cure was completely effected. On the 18th of September a shell from the lines fell into a house where the town-major captain Burke, with majors

Mercier

Gibraltar. By the beginning of June 1781, the enemy had relaxed considerably in their firing, seldom exceeding 600 shot in a day; and continued gradually to diminish this number so remarkably, that towards the end of August they seldom fired in the day, and only discharged six or seven, and sometimes not above three, shot in the night. The batteries at land, however, were succeeded by the gun-boats; which renewed their attacks every day, keeping the garrison in continual alarm, and never failing to do more or less execution. To restrain them, therefore, a battery of guns capable of throwing their shot to a great distance was erected as near as possible to the enemy; and as it reached their very camp, it was determined to open it upon them as often as the gun-boats made their attacks; which being soon perceived, they thought it prudent to desist in some measure from that mode of hostility. They continued still, however, to improve their works, and for this purpose employed the best engineers both of France and Spain; so that by the latter part of November 1781, they had them brought to such a state of perfection as filled both kingdoms with the most sanguine expectations of success. Governor Elliot, however, far from being dismayed at these formidable bulwarks, suffered them to proceed without molestation to the end of their scheme, that he might as in a moment destroy the labour of so many months, and thus render the disappointment the greater. In the night of the 27th of November, a chosen party of 2000 men was detached, in order to destroy the enemies works and batteries; and their success was equal to their most sanguine expectation. They marched out in great order and silence about two o'clock in the morning, under the command of brigadier-general Ross; after which they proceeded with the same circumspection, but with the utmost celerity, to the enemy's works, which they stormed and overthrew with astonishing rapidity. The Spaniards were instantly thrown into confusion, and fled

on every side; the guns and mortars on the batteries were all spiked up; and the artillery-men, artificers, and sailors, exerted themselves so vigorously, that in the space of an hour the magazines were blown up, the store-houses of arms, ammunition, and military implements of every kind, and all the works that had been constructed, were set on fire, and totally consumed; the whole damage done on this occasion being estimated at upwards of two millions sterling.

For several days after this disaster the Spaniards continued inactive, without even making any attempt to extinguish their batteries, which still continued in flames; but in the beginning of December, as if suddenly aroused from their reverie, upwards of 1000 men were set to work in order to prepare a great number of fascines, from whence it was concluded that they designed to repair their works. In this they proceeded with their usual perseverance and diligence; but as the former methods of attack had constantly failed, it was evident, that if the place could be reduced at all, it must be by some means hitherto unattempted; and for the reduction of this single fortress, the Spanish monarch, after the conquest of Minorca, determined to employ the whole strength of his empire. Among the various projects formed at this time, that of the chevalier D'Arcon, a French engineer of distinction, proved the most acceptable to the court of Spain; and though the expence attending it was immense, this seemed in the present circumstances to be a matter of small consideration. His plan was to construct such floating batteries as might neither be liable to be sunk nor set on fire. With this view their bottoms were made of the thickest timber, and their sides of wood and cork long soaked in water, with a layer of wet-sand betwixt them. Their thickness was such, that they were impenetrable to cannon-shot; and to prevent the effects of red-hot balls, a number of pipes were contrived to carry water through every part of the vessel, and pumps sufficient to furnish

42
Floating
batteries
invented by
the cheva-
lier D'Ar-
con.

Mercier and Vignoles of the 39th regiment were sitting. It took off major Burke's thigh; afterwards fell through the floor into the cellar: there it burst, and forced the flooring with the unfortunate major up to the ceiling. When assistance came, they found him almost buried in the ruins of the room. He was instantly conveyed to the hospital, where he died soon after the wounded part had been amputated. Majors Mercier and Vignoles had time to escape before the shell burst; nevertheless they were slightly wounded by the splinters, as were a serjeant and his daughter, who happened to be in the cellar when the shell entered.

The following are related as instances of very extraordinary escapes from the destructive power of these engines, and which indeed it seems difficult to account for.—A corporal had the muzzle of his firelock closed, and the barrel twisted like a French horn, by a shell, without any injury to his person. A shell happened to fall into a tent where two soldiers were asleep, without awakening them by its fall. A serjeant in an adjacent tent heard it, and ran near 40 yards to a place of safety, when he recollected the situation of his comrades. Thinking the shell had fallen blind, he returned and awakened them; both immediately rose, but continued by the place, debating on the narrow escape they had had, when the shell exploded, and forced them with great violence against a garden wall, but “miraculously” did no further mischief than destroying every thing in the tent. On the new year's day of 1782, an officer of artillery observed a shell falling towards the place where he stood, and got behind a traverse for protection. This he had scarcely done, when the shell fell into the traverse, and instantly entangled him in the rubbish: one of the guard, named *Martin*, observing his distress, generously risked his own life in defence of his officer, and ran to extricate him: but finding his own efforts ineffectual, called for assistance; when another of the guard joining him, they relieved the officer from his situation; and almost the same instant the shell burst, and levelled the traverse with the ground. *Martin* was afterwards promoted, and rewarded by the governor; who at the same time told him, that “he should equally have noticed him for attending to his comrade.” A shell happening to fall into the room where ensign Mackenzie of the 73d regiment was sitting, carried away part of his chair, and fell into the room below, where it burst, lifting him and the chair from the floor without further injury.

40
The works
of the ene-
my brought
to the ut-
most per-
fection.

41
They are
entirely de-
stroyed.

Gibraltar.

nish a constant supply for the purpose. The people at the batteries were sheltered from the bombs by a rope-netting made sloping, that they might roll off, and spread with wet skins to prevent fire. Ten of these batteries were constructed out of the hulls of large vessels, some of 50 or 60 guns, cut down for that purpose, and carrying from 10 to 28 guns each, with about half as many in reserve in case of accidents. Each gun was served by 36 artillery-men; and these floating batteries were to be seconded by 80 large boats carrying guns and mortars of heavy metal; a great number of ships of force and frigates, with some hundreds of small craft, were to accompany them with troops, for the instant execution of what might be judged necessary. On this occasion upwards of 1000 pieces of artillery and 80,000 barrels of gun-powder were provided. A body of 12,000 of the best troops of France were now added to the Spanish army before the place; the body of engineers was the best that both kingdoms could produce; and numbers of volunteers, of the best families in both, attended the siege. Numbers of military gentlemen also came from every part of Europe to be witnesses of what passed at this celebrated siege, which was now compared to the most famous recorded in history. The conducting of it was committed to the duke de Crillon, who had distinguished himself by the conquest of Minorca. Two princes of the blood royal of France, the count of Artois brother to the king, and the duke of Bourbon his cousin, came to be witnesses of this extraordinary enterprise. These behaved with the greatest politeness both to the governor and garrison. The count of Artois transmitted a packet of letters for various individuals in the garrison, which had been intercepted and carried to Madrid, and which he requested that he might be the means of conveying to those for whom they were designed. Both he and the duke of Bourbon signified to General Elliot the high regard they had for his person and character; and the duke de Crillon himself took this opportunity of expressing the same sentiments, and to intréat him to accept of some refreshments. General Elliot returned a polite answer, but accepted of the present with reluctance, and requested him for the future not to confer any favours of that kind upon him.

43
Prodigious
armament
brought be-
fore the for-
tress.

Such a prodigious armament raised the confidence of the besiegers so high, that they looked upon the conquest of the place as an absolute certainty. They began to be impatient at the delays which arose in bringing matters to the utmost point of perfection; and the commander in chief was thought by far too modest, when he said, that the garrison might hold out for a fortnight. "It appeared (says Captain Drinkwater) that they meant, previous to their final efforts, to strike if possible a terror through their opponents, by displaying an armament more powerful than had probably ever been brought before any fortrefs. Forty-seven sail of the line, including three inferior two deckers; ten battering ships, deemed perfect in design, and esteemed invincible, carrying 212 guns; innumerable frigates, xebèques, bomb-ketches,

cutters, gun and mortar boats, and smaller craft for disembarking men, were assembled in the bay. On the land side were most stupendous and strong batteries and works, mounting 200 pieces of heavy ordnance, and protected by an army of near 40,000 men, commanded by a victorious and active general, and animated by the immediate presence of two princes of the blood royal of France, with other dignified personages, and many of their own nobility. In their certainty of success, however, the enemy seemed entirely to have overlooked the nature of that force which was opposed to them; for though the garrison scarcely consisted of more than 7000 effective men, including the marine brigade, they forgot that they were now veterans in this service, had long been habituated to the effects of artillery, and were by degrees prepared for the arduous conflict that awaited them. We were at the same time commanded by officers of approved courage, prudence, and activity; eminent for all the accomplishments of their profession, and in whom we had unbounded confidence. Our spirits too were not a little elevated by the success attending the firing of red-hot shot (c), which in this attack we hoped would enable us to bring our labours to a conclusion, and relieve us from the tedious cruelty of a vexatious blockade."

As a prelude to the dreadful storm which was about to be poured forth on this devoted garrison, the enemy, on the 9th of September 1782, opened a battery of 64 of their largest cannon, which was shortly accompanied with a terrible fire from other batteries, and a great number of mortars. On this and the following day an attack was made upon the batteries erected on Europa Point (so called from being the most southerly point of the continent of Europe), which at that time were entirely under the management of captain Curtis of the Brilliant frigate, who had distinguished himself during the siege, and now commanded a brigade of seamen by whom the batteries were served. By these the fire of the Spaniards was so warmly returned, that they not only could make no impression, but were forced to retire, after having received so much damage, that two of their principal ships were obliged to withdraw to the bay of Algeiras, opposite to Gibraltar, in order to refit. On the 12th the enemy made preparations for the ensuing day, which was allotted for their grand and decisive attack. Accordingly, on the morning of the 13th, the ten floating batteries came forward, under the command of Don Buenventura de Moreno, a Spanish officer of great gallantry, and who had signalized himself at the taking of Minorca. Before ten o'clock they had all got into their proper stations, anchoring in a line about a thousand yards distant from the shore. As soon as they were properly arranged, they began a heavy cannonade, and were seconded by all the cannon and mortars in the enemy's lines and approaches, at the same time that the garrison opened all its batteries both with hot and cold shot from the guns, and shells from the howitzers and mortars. This terrible fire continued on both sides without intermission until noon; when that

44
Decisive at-
tack on the
13th of Sep-
tember,
1782.

(c) This was suggested by lieutenant-governor Boyd, and had been attended with remarkable success, September 8th, when the enemy's advanced works were almost destroyed by it.

Gibraltar. that of the Spaniards began to slacken, and the fire of the garrison to obtain a superiority. About two o'clock the principal battering ship commanded by Don Moreno was observed to emit smoke as if on fire, and some men were seen busy upon the roof searching from whence it proceeded. The fire from the garrison was now kept up without the least discontinuance or diminution, while that from the floating batteries was perceived sensibly to decrease; so that about seven in the evening they fired but few guns, and that only at intervals. At midnight the admiral's ship was plainly seen to burn, and an hour after was completely in flames. Eight more of these batteries took fire successively; and on the signals of distress made by them, the multitude of feluccas, launches, and boats, with which they were surrounded, all came to their assistance, and began to take the men out of the burning vessels. Captain Curtis, who lay ready with the gun-boats to take advantage of any favourable circumstance, came upon them at two in the morning, and forming a line on the enemy's flank, advanced upon them with such order and expedition as to throw them into immediate confusion. At this sudden and unexpected attack they were so astonished and disconcerted, that they fled precipitately with all their boats, totally abandoning their floating batteries to be burnt, and all who were in them to perish in the flames. This would undoubtedly have been their fate, had not captain Curtis extricated them from the fire at the imminent danger of his own life and that of his men. In this work he was so eager, that while his boat was along-side of one of the largest batteries, it blew up, and the fragments of the wreck spreading all around to a vast distance, some heavy pieces of timber fell into his boat and pierced through its bottom, killing one man and wounding several others. He escaped with difficulty out of this boat, which was sunk, as well as another, by the same accident. The floating batteries were every one consumed; and the violence with which they exploded was such, that doors and windows at a great distance on shore were burst open. About 400 people were saved from them; many of whom were picked up floating on rafts and pieces of timber. Indeed the blowing up of the batteries as the flames reached their powder-rooms, and the discharge of the guns in succession as the metal became heated by the fire, rendered any attempt to save them very dangerous.

45
terrible
destruction
of the Spaniards.

46
inactivity
of the combined fleet.

This terrible catastrophe took place in sight of the combined fleets of France and Spain. It had been proposed that they should co-operate upon this important occasion, by attacking the garrison at Europa Point, and such places as appeared most exposed to an attempt by sea. This, it was afterwards said, must have occasioned a material diversion of the garrison's force, and, by dividing it, have weakened considerably the vigorous means of defence used in those parts which were actually attacked. The reason assigned for this inactivity was the want of wind.

47
the blockade continued.

Though this terrible repulse effectually convinced the Spaniards that Gibraltar could not be taken by force, some hope still remained, that, without any further exertions on their part, the garrison would be obliged to surrender from want of ammunition and provisions. With this view they continued to blockade it closely, and to cut off all communication, flattering

themselves that Britain would not be able to collect a naval force sufficient to drive their fleet from the bay before the fortress was reduced to extremity; and this, they imagined, must be the case in a few days. Such diligence, however, had been used on the part of the British, that a fleet was already assembled at Portsmouth, consisting of 35 sail of the line, in excellent condition, and filled with the best officers and sailors in Europe. The command was given to Lord Howe, who was accompanied in the expedition by admirals Barrington, Milbank, Hood, Sir Richard Hughes, and commodore Hotham, all of them men eminent in their profession. At the same time also it fortunately happened, that a large British fleet of merchantmen had just arrived in safety from the Baltic; and that a Dutch squadron, which had been cruising on their own coasts, not being able to penetrate southwards in order to join the French, had retired into port, and given up the intention of effecting any junction for that season.

At this time the British nation was in the utmost anxiety about the fate of Gibraltar. The progress of the ships was delayed by contrary winds, and it was not until they had gained the southern coast of Portugal that they received information of the defeat of the enemy's attempt on the 13th of September. On the 11th of October Lord Howe entered the Straits, and several of the storeships destined for Gibraltar came safe to anchor under the cannon of the fort without any molestation from the enemy. The combined fleet in the mean time had been much damaged by a storm; two ships of the line were driven ashore near Algeiras; two more were driven out of the bay into the Mediterranean; others lost their masts, and most of them suffered considerably. One in particular, a ship of 70 guns, was carried by the storm across the bay, and ran aground under the works of Gibraltar, where she was taken by the garrison, with her whole complement of men, consisting of 700. Notwithstanding the endeavours of the enemy to destroy her, she was safely got off, and properly repaired. The combined fleet, however, put to sea on the 13th, with a view to prevent the remaining storeships that had overshot the bay to the east from making good their entrance into it; and at the same time to rejoin the two ships that had been separated from the main body by the storm. Having the advantage of the wind, they bore down upon the British fleet, which drew up in order of battle to receive them; but notwithstanding their superiority, they declined coming to an engagement. On the wind becoming more favourable next day, Lord Howe took the opportunity to bring in the storeships that were in company; and the day following the remainder were conveyed to Gibraltar, the troops for the reinforcement of the garrison were landed, with a large supply of powder and ample provision in every other respect. As they returned through the straits they were threatened with an engagement by the combined fleets; but though the latter had a superiority of 12 ships of the line, they kept at a wary distance. Some firing indeed took place, but it was attended with little effect on either side.

48
The garrison finally relieved.

This last relief proved entirely decisive; for though the blockade continued till news arrived of the preliminaries of peace being signed, in the beginning of February 1783, no other attack was made. The news of the

Gibraltar,
Gibson.

the pacification were received with the utmost joy by the Spaniards. Mutual civilities passed between the commanders in chief, and the Duke de Crillon paid many handsome compliments to the governor and garrison for their noble defence; declaring that he had exerted himself to the utmost of his abilities, and though he had not proved successful, yet he was happy in having his sovereign's approbation of his conduct.

The possession of Gibraltar is esteemed of very great consequence to Britain. It not only gives us the command of the Straits, and their navigation; but affords refreshment and accommodation to our fleets in time of war, and to our merchantment at all times; which, to a maritime power, is of very great advantage. From its situation, it divides both the kingdoms of France and Spain; that is, it hinders a ready communication by sea between the different parts of these kingdoms. This, of course, hinders the conjunction of the fleets and squadrons with each other, or at least renders it so difficult as to be a perpetual check upon these ambitious powers. It awes also the piratical states of Barbary, and in like manner the emperor of Morocco; inasmuch, that our commerce is more safe than that of any other European power, which gives us great advantages in point of freight. It is otherwise highly favourable to our trade in the Mediterranean and Levant. It procures us the respect of the Italian and other powers; who, though far distant from Britain, must consider this as an instance of her power to hurt or assist them. It also saves us the expence of squadrons and convoys, upon any disputes or disturbances that may happen among those powers, and which would otherwise be necessary for the protection of our navigation.

GIBSON (RICHARD), an English painter, commonly called the *Dwarf*, was originally page to a lady at Mortlake; who, observing that his genius led him to painting, had the generosity to get him instructed in the rudiments of that art. He devoted himself to Sir Peter Lely's manner, and copied his pictures to admiration, especially his portraits: his paintings in water-colours were also esteemed. He was in great favour with Charles I. who made him his page of the back-stairs; and he had the honour to instruct in drawing queen Mary and queen Anne when they were princesses. He married one Mrs Anne Shepherd, who was also a dwarf; on which occasion king Charles I. honoured their marriage with his presence, and gave away the bride. Mr Waller wrote a poem on this occasion, intitled "The marriage of the Dwarfs;" in which are these lines:

"Design or chance makes others wive,
"But nature did this match contrive;
"Eve might as well have Adam fled,
"As she deny'd her little bed
"To him, for whom heav'n seem'd to frame
"And measure out this only dame."

Mr Fenton, in his notes on this poem, observes that he had seen this couple painted by Sir Peter Lely; and that they were of an equal stature, each being three feet ten inches high. However, they had nine children, five of whom arrived at maturity; these well proportioned, and of the usual standard of mankind. But what nature denied this couple in stature, she gave them in length of days; for Mr Gibson died in the

75th year of his age; and his wife, having survived him almost 20 years, died in 1709, aged 89.

GIBSON (Dr Edmund), bishop of London, was born in Westmoreland, in 1669. He applied himself early and vigorously to learning, and displayed his knowledge in several writings and translations, which recommended him to the patronage of archbishop Tennison. He was appointed domestic chaplain to his Grace; and we soon after find him rector of Lambeth, and archdeacon of Surry. Becoming thus a member of the convocation, he engaged in a controversy, which was carried on with great warmth by the members of both houses, and defended his patron's rights, as president, in eleven pamphlets; he then formed and completed his more comprehensive scheme of the legal duties and rights of the English clergy, which was at length published under the title of *Codex Juris Ecclesiastici Anglicani*, in folio. Archbishop Tennison dying in 1715, and Dr Wake bishop of Lincoln being made archbishop of Canterbury, Dr Gibson succeeded the latter in the see of Lincoln, and in 1720 was promoted to the bishoprick of London. He now not only governed his diocese with the most exact regularity, but by his great care promoted the spiritual affairs of the church of England colonies in the West Indies. He was extremely jealous of the least of the privileges belonging to the church; and therefore, though he approved of the toleration of the Protestant Dissenters, he continually guarded against all the attempts made to procure a repeal of the corporation and test acts; in particular, his opposition to those licentious assemblies called *masquerades*, gave great umbrage at court, and effectually excluded him from all further favours. He spent the latter part of his life in writing and printing pastoral letters, visitation-charges, occasional sermons, and tracts against the prevailing immoralities of the age. His pastoral letters are justly esteemed as the most masterly productions against infidelity and enthusiasm. His most celebrated work, the *Codex*, has been already mentioned. His other publications are, 1. An edition of Drummond's *Polemo-Middiana*, and James V. of Scotland's *Cantilena Russica*, with notes. 2. The *Chronicon Saxonicum*, with a Latin translation, and notes. 3. *Reliquie Spelmanianae*, the posthumous works of Sir Henry Spelman, relating to the laws and antiquities of England. 4. An edition of *Quintilian de Arte Oratoria*, with notes. 5. An English translation of Camden's *Britannia*, with additions, two volumes folio: and, 6. A number of small pieces, that have been collected together and printed in three volumes folio.—His intense application to study impaired his health; notwithstanding which, he attained the age of 79. He expired in September 1748, after an episcopate of near 33 years.—With regard to bishop Gibson's private life and character, he was in every respect a perfect economist. His abilities were so well adapted to discharge the duties of his sacred function, that, during the incapacity of archbishop Wake, the transaction of ecclesiastical affairs was committed to the bishop of London. He was a true friend to the established church and government, and as great an enemy to persecution. He was usually consulted by the most learned and exalted personages in church and state, and the great-

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greatest deference was paid to his judgment. He possessed the social virtues in an eminent degree; his beneficence was very extensive; and had such generosity, that he freely gave two thousand five hundred pounds, left him by Dr Crow, who was once his chaplain, to Crow's own relations, who were very poor.

GIDEON the son of Joash, of the tribe of Manasseh. He dwelt in the city of Ophrah; and had a very extraordinary call to deliver the Israelites from the oppression of the Midianites, to which they had become subject after the death of Barak and Deborah. Having effected their deliverance by supernatural aid, he was chosen judge of Israel in the year of the world 2759, and died in 2768. (See Judges, Chap. vi, vii, & viii.

GIFT, *Donum*, in law, is a conveyance which passeth either lands or goods; and is of a larger extent than a grant, being applied to things moveable and immoveable; yet as to things immoveable, when taken strictly, it is applicable only to lands and tenements given in tail; but *gift* and *grant* are too often confounded.

New-Year's Gifts, presents made on new-year's day, as a token of the giver's good-will, as well as by way of preface of a happy year.

This practice is very ancient, the origin of it among the Romans being referred to Tatius king of the Sabines, who reigned at Rome conjointly with Romulus, and who having considered as a good omen a present of some sprigs of vervain gathered in a wood consecrated to Strenia the goddess of strength, which he received on the first day of the new year, authorised this custom afterwards, and gave to these presents the name of Strenæ. However this may be, the Romans on that day celebrated a festival in honour of Janus, and paid their respects at the same time to Juno; but they did not pass it in idleness, lest they should become indolent during the rest of the year. They sent presents to one another of figs, dates, honey, &c. to show their friends that they wished them a happy and agreeable life. Clients, that is to say those who were under the protection of the great, carried presents of this kind to their patrons, adding to them a small piece of silver. Under Augustus, the senate, the knights, and the people, presented such gifts to him, and in his absence deposited them in the Capitol. Of the succeeding princes some adopted this custom, and others abolished it, but it always continued among the people. The early Christians condemned it, because it appeared to be a relique of Paganism, and a species of superstition; but when it began to have no other object than that of being a mark of veneration and esteem, the church ceased to disapprove of it.

GIGG, **GIGA**, or **GIG**, in music and dancing, a gay, brisk, sprightly composition, and yet in full measure, as well as the allemand, which is more serious. Menage takes the word to arise from the Italian *giga*, a musical instrument mentioned by Dante. Others suppose it to be derived from the Teutonic *gieg*, or *glingbe*, "a fiddle." This is a favourite air in most nations of Europe: its characteristic is double time, marked $\frac{6}{8}$, or $\frac{1}{2}$: it consists of two strains, without any determinate number of bars.

GIGGLEWICK, a town in the West Riding of Yorkshire, half a mile from Settle, stands on the river

Ribble; where, at the foot of a mountain, is a spring, the most noted in England for ebbing and flowing sometimes thrice in an hour, and the water subsides three quarters of a yard at the reflux, though the sea is 30 miles off. At this town is an eminent free grammar school; and in the neighbourhood are dug up flags, slate, and stone, with a good lime-kiln.

GILAN, or **GHILAN**, a considerable province of Asia in Persia, lying on the side of the Caspian sea, and to the S. W. of it. It is supposed to be the Hyrcania of the ancients. It is very agreeably situated, having the sea on one side and high mountains on the other; and there is no entering in but through narrow passes, which may easily be defended. The sides of the mountains are covered with many sorts of fruit-trees, and in the highest parts of them there are deer, bears, wolves, leopards, and tygers; which last the Persians have a method of taming, and hunt with them as we do with dogs. Gilan is one of the most fruitful provinces of all Persia; and produces abundance of silk, oil, wine, rice, and tobacco, besides excellent fruits. The inhabitants are brave, and of a better complexion than the other Indians, and the women are accounted extremely handsome. Resht is the capital town.

GIHON, (anc. geog.) one of the rivers of Paradise; according to Wells, the eastern branch of the Euphrates, into which it divides after its conjunction with the Tigris.

GILBERT, or **GILBERD**, (William), a physician, was born at Colchester in the year 1540, the eldest son of the recorder of that borough. Having spent some time in both universities, he went abroad; and at his return settled in London, where he practised with considerable reputation. He became a member of the college of physicians, and physician in ordinary to Queen Elizabeth, who, we are told, gave him a pension to encourage him in his studies. From his epitaph it appears that he was also physician to King James I. He died in the year 1603, aged 63; and was buried in Trinity-church in Colchester, where a handsome monument was erected to his memory. His books, globes, instruments, and fossils, he bequeathed to the college of physicians, and his picture to the school-gallery at Oxford. He wrote, 1. *De magnete, magnetisque corporibus, et de magno magnete tellure, physiologia nova*; London 1600, folio. 2. *De mundo nostro sublunari. philosophia nova*; Amsterdam 1651, 4to. He was also the inventor of two mathematical instruments for finding the latitude at sea without the help of sun, moon, or stars. A description of these instruments was afterwards published by Thomas Blondeville in his *Theoriques of the planets*.

GILBERT (Sir Humphrey), a brave officer and skilful navigator, was born about the year 1539, in Devonshire, of an ancient and honourable family. Though a second son, he inherited a considerable fortune from his father. He was educated at Eaton, and afterwards at Oxford; where probably he did not continue long, as he hath escaped the industrious Anthony Wood. It seems he was intended to finish his studies in the Temple; but being introduced at court by his aunt Mrs Catherine Ashley, then in the queen's service, he was diverted from the study of the law, and commenced soldier. Having distinguished him-

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self in several military expeditions; particularly that to Newhaven in 1563, he was sent over to Ireland to assist in suppressing a rebellion; where, for his signal services, he was made commander in chief and governor of Munster, and knighted by the lord deputy, Sir Henry Sidney, on the first day of the year 1570. He returned soon after to England, where he married a rich heiress. Nevertheless, in 1572, he sailed with a squadron of nine ships to reinforce Colonel Morgan, who at that time meditated the recovery of Flushing. Probably on his return to England he resumed his cosmographical studies, to which he was naturally inclined: for, in the year 1576, he published his book on the north-west passage to the East Indies; and as Martin Frobisher failed the same year, probably it was in consequence of this treatise. In 1578, he obtained from the queen a very ample patent, empowering him to discover and possess in North America any lands then unsettled. He sailed to Newfoundland, but soon returned to England without success: nevertheless, in 1583, he embarked a second time with five ships, the largest of which put back on account of a contagious distemper on board. Our general landed on Newfoundland on the third of August, and on the fifth took possession of the harbour of St John's. By virtue of his patent, he granted leases to several people; but though none of them remained there at that time, they settled afterwards in consequence of these leases: so that Sir Humphrey deserves to be remembered as the real founder of the vast American empire. On the 20th of August he put to sea again, on board a small sloop; which on the 29th foundered in a hard gale of wind. Thus perished Sir Humphry Gilbert; a man of quick parts, a brave soldier, a good mathematician, a skilful navigator, and of a very enterprising genius. We learn also, that he was remarkable for his eloquence, being much admired for his patriotic speeches both in the English and Irish parliaments. He wrote "A discourse to prove a passage by the north-west to Cathaia and the East Indies, printed Lond. 1576." This treatise, which is a masterly performance, is preserved in Hakluyt's collection of voyages, vol. iii. p. 111. The style is superior to most, if not to all, the writers of that age; and shows the author to have been a man of considerable reading. He mentions, at the close of this work, another treatise on navigation, which he intended to publish: it is probably lost.

GILBERTINES, an order of religious, thus called from St Gilbert of Sempringham, in the county of Lincoln, who founded the same about the year 1148: the monks of which observed the rule of St Augustine; and were accounted canons: and the nuns that of St Benedict.

The founder of this order erected a double monastery, or rather two different ones, contiguous to each other, the one for men, the other for women, but parted by a very high wall.

St Gilbert himself founded 13 monasteries of this order, viz. four for men alone, and nine for men and women together, which had in them 700 brethren and 1500 sisters. At the dissolution there were about 25 houses of this order in England and Wales.

GILBOA, (anc. geog.), mountains of Samaria, stretching out from west to east, on the confines of the

half tribe of Manasseh, and of the tribe of Issachar; and to the south part of the valley of Jezreel, beginning westward at the city of Jezreel, situated at the foot of these mountains, reaching almost quite to the Jordan, lying at the distance of six miles from Scythopolis. Famous for the death of Saul and his son Jonathan, and the defeat of the Israelites by the Philistines.

GILCHRIST (Dr Ebenezer), an eminent Scots physician, was born at Dumfries in 1707. He began the study of medicine at Edinburgh, which he afterwards prosecuted at London and Paris. He obtained the degree of doctor of medicine from the university of Rheims; and in the year 1732 he returned to the place of his nativity, where he afterwards constantly resided, and continued the practice of medicine till his death. It may with justice be said, that few physicians of the present century have exercised their profession in a manner more respectable or successful than Dr Gilchrist; and few have contributed more to the improvement of the healing art. Having engaged in business in an early period of life, his attention was wholly devoted to observation. Endowed by nature with a judgment acute and solid, with a genius active and inventive, he soon distinguished himself by departing, in various important particulars, from established but unsuccessful modes of practice. Several of the improvements which he introduced have procured him great and deserved reputation, both at home and abroad. His practice, in ordinary cases, was allowed to be judicious, and placed him high in the confidence and esteem of the inhabitants of that part of the country where he lived. But his usefulness was not confined to his own neighbourhood. On many occasions he was consulted by letter from the most distant parts of the country. In different collections are to be found several of his performances, which prove that he had something new and useful to offer upon every subject to which he applied himself. But those writings which do him the greatest honour, are two long dissertations on Nervous Fevers, in the Medical Essays and Observations published by a Society in Edinburgh; and a treatise on the use of Sea-voyages in medicine, which first made its appearance in the year 1757, and was afterwards re-printed in 1771. By means of the former, the attention of physicians was first turned to a species of fever which is now found to prevail universally in this country; and the liberal use of wine, which he was the first among the moderns to recommend, has since been adopted in these fevers by the most judicious physicians of the present age, and has probably contributed not a little to the success of their practice. His treatise on Sea-voyages points out in a manner so clear, and so much on the sure footing of experience, their utility in various distempers, particularly in consumptions, that there is now a prospect of our being able to employ a remedy in this untractable disease much more efficacious than any hitherto in use. Dr Gilchrist died in 1774.

GILD, or GUILD. See GUILD.

GILDAS (surnamed *the Wise*), was born in Wales in the year 511. Where he was educated is uncertain; but it appears from his own writings that he was a monk. Some writers say that he went over to Ireland; others, that he visited France and Italy. They agree however in asserting, that after his return to

Eng-

Gilchrist
Gildas

¹ Gilding. England he became a celebrated and most assiduous preacher of the gospel. Du Pin says he founded a monastery at Venetia in Britain. Gildas is the only British author of the sixth century whose works are printed; they are therefore valuable on account of their antiquity, and as containing the only information we have concerning the times of which he wrote. His History of Britain is, however, a very flimsy performance, and his style obscure and inelegant.

GILDING, the art of spreading or covering a thing over with gold, either in leaf or liquid. The art of gilding was not unknown among the ancients, though it never arrived among them at the perfection to which the moderns have carried it. Pliny assures us, that the first gilding seen at Rome was after the destruction of Carthage, under the censorship of Lucius Mummius, when they began to gild the ceilings of their temples and palaces; the Capitol being the first place on which this enrichment was bestowed. But he adds, that luxury advanced on them so hastily, that in a little time you might see all, even private and poor persons, gild the very walls, vaults, &c. of their houses.

We need not doubt but they had the same method with us, of beating gold, and reducing it into leaves; though it should seem they did not carry it to the same height, if it be true which Pliny relates, that they only made 750 leaves of four fingers square out of a whole ounce. Indeed he adds, that they could make more; that the thickest were called *bractee Prænestine*, by reason of a statue of the goddess Fortune at Præneste gilt with such leaves; and that the thinner sort were called *bractee quæstorie*.

The modern gilders do also make use of gold-leaves of divers thickneses; but there are some so fine, that a thousand do not weigh above four or five drachms. The thickest are used for gilding on iron and other metals; and the thinnest on wood. But we have another advantage over the ancients in the manner of using or applying the gold: the secret of painting in oil, discovered of late ages, furnishes us with means of gilding works that shall endure all the injuries of time and weather, which to the ancients was impracticable. They had no way to lay the gold on bodies that would not endure the fire but with whites of eggs or size, neither of which will endure the water; so that they could only gild such places as were sheltered from the moisture of the weather.

The Greeks called the composition on which they applied their gilding on wood *leucophæum* or *leucophorum*; which is described as a sort of glutinous compound earth, serving in all probability to make the gold stick and bear polishing. But the particulars of this earth, its colour, ingredients, &c. the antiquaries and naturalists are not agreed upon.

The lustre and beauty of gold have occasioned several inquiries and discoveries concerning the different methods of applying it to different substances. Hence the art of gilding is very extensive, and contains many particular operations and various management.

³ A colour of gold is given by painting and by varnishes, without employing gold; but this is a false kind of gilding. Thus a very fine golden colour is given to brads and to silver, by applying upon these metals a gold-coloured varnish, which, being transparent, shows

all the brilliancy of the metals beneath. Many ornaments of brads are varnished in this manner, which is called *gold laquering*, to distinguish them from those which are really gilt. Silver-leaves thus varnished are put upon leather, which is then called *gilt leather*. See LAQUER.

Amongst the false gilding may also be reckoned those which are made with thin leaves of copper or brads, called *Dutch-leaf*. In this manner are made all the kinds of what is called *gilt paper*.

In the true gilding, gold is applied to the surface of bodies. The gold intended for this purpose ought in general to be beat into thin leaves, or otherwise divided into very fine parts.

As metals cannot adhere well merely by contact to any but to other metallic substances, when gold is to be applied to the surface of some unmetallic body, that surface must be previously covered with some gluey and tenacious substance, by which the gold shall be made to adhere. These substances are in general called *sizes*. Some of these are made of vegetable and animal glues, and others of oily, gluey, and drying matters. Upon them the leaves of gold are applied, and pressed down with a little cotton or a hare's foot; and when the whole is dry, the work is to be finished and polished with a hard instrument, called a *dog's tooth*, to give lustre.

When the work is required to be capable of resisting rain or moisture, it ought to be previously covered with a composition of drying oil and yellow ochre ground together; otherwise a water-size may be used, which is prepared by boiling cuttings of parchment or white leather in water, and by mixing with this some chalk or whiting: several layers of this size must be laid upon the wood, and over these a layer of the same size mixed with yellow ochre. Lastly, another mixture, called *gold size*, is to be applied above these; upon which the gold-leaves are to be fixed. This gold size, the use of which is to make the gold-leaf capable of being burnished, is composed of tobacco-pipe clay, ground with some ruddle or black lead, and tempered with a little tallow or oil of olives. The edges of glasses may be gilt by applying first a very thin coat of varnish, upon which the gold-leaf is to be fixed; and when the varnish is hardened, may be burnished. This varnish is prepared by boiling powdered amber with linseed oil in a brads vessel to which a valve is fitted, and by diluting the above solution with four or five times its quantity of oil of turpentine; and that it may dry sooner, it may be ground with some white lead.

⁶ The method of applying gold upon metals is entirely different. The surface of the metal to be gilt is first to be cleaned; and then leaves are to be applied to it, which, by means of rubbing with a polished blood-stone, and a certain degree of heat, are made to adhere perfectly well. In this manner silver-leaf is fixed and burnished upon brads in the making of what is called *French plate*, and sometimes also gold-leaf is burnished upon copper and upon iron.

Gold is applied to metals in several other manners. One of these is by previously forming the gold into a paste or amalgam with mercury. In order to obtain a small amalgam of gold and mercury, the gold is first to be reduced into thin plates or grains, which are heated red-hot, and thrown into mercury previously

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heated, till it begins to smoke. Upon stirring the mercury with an iron rod, the gold totally disappears. The proportion of mercury to gold is generally as six or eight to one.

With this amalgam the surface of the metal to be gilded is to be covered; then a sufficient heat is to be applied to evaporate the mercury; and the gold is lastly to be burnished with a blood-stone.

This method of gilding by amalgamation is chiefly used for gilding copper, or an alloy of copper, with a small portion of zinc, which more readily receives the amalgam; and is also preferable for its colour, which more resembles that of gold than the colour of copper. When the metal to be gilt is wrought or chased, it ought to be previously covered with quicksilver before the amalgam is applied, that this may be easier spread: but when the surface of the metal is plain, the amalgam may be applied directly to it. The quicksilver or amalgam is made to adhere to the metal by means of a little aquafortis, which is rubbed on the metallic surface at the same time, by which this surface is cleansed from any rust or tarnish which might prevent the union or adhesion of the metals. But the use of the nitrous acid in this operation is not, as is generally supposed, confined merely to cleanse the surface of the metal to be gilt from any rust or tarnish it may have acquired; but it also greatly facilitates the application of the amalgam to the surface of that metal, probably in the following manner: It first dissolves part of the mercury of the

7.
Use of the
nitrous acid
in gilding.

amalgam; and when this solution is applied to the copper, this latter metal having a stronger disposition to unite with the nitrous acid than the mercury has, precipitates the mercury upon its surface, in the same manner as a polished piece of iron precipitates upon its surface copper from a solution of blue vitriol. When the metal to be gilt is thus covered over with a thin precipitated coat of mercury, it readily receives the amalgam. In this solution and precipitation of mercury, the principal use of the nitrous acid in the process of gilding appears to consist. The amalgam being equally spread over the surface of the metal to be gilt by means of a brush, the mercury is then to be evaporated by a heat just sufficient for that purpose; for if it be too great, part of the gold may also be expelled, and part of it will run together, and leave some of the surface of the metal bare: while the mercury is evaporating, the piece is to be from time to time taken from the fire, that it may be examined, that the amalgam may be spread more equally by means of a brush, that any defective parts of it may be again covered, and that the heat may not be too suddenly applied to it: when the mercury is evaporated, which is known by the surface being entirely become of a dull yellow colour, the metal must then undergo other operations, by which the fine gold colour is given to it. First, the gilded piece of metal is rubbed with a scratch brush (which is a brush composed of brass wire) till its surface is made smooth; then it is covered over with a composition called *gilding wax*, and is again exposed to the fire till the wax be burnt off. This wax is composed of bees-wax, sometimes mixed with some of the following substances; red ochre, verdegris, copper-scales, alum, vitriols, borax: but according to Dr Lewis, the saline substances alone are sufficient, without any wax. By this operation the colour of the gild-

ing is heightened; and this effect seems to be produced by a perfect dissipation of some mercury remaining after the former operation. This dissipation is well effected by this equable application of heat. The gilt surface is then covered over with a saline composition, consisting of nitre, alum, or other vitriolic salt, ground together, and mixed up into a paste with water or urine. The piece of metal thus covered is exposed to a certain degree of heat, and then quenched in water. By this method its colour is further improved, and brought nearer to that of gold. This effect seems to be produced by the acid of nitre (which is disengaged by the vitriolic acid of the alum or other vitriolic salt during the exposure to heat) acting upon any particles of copper which may happen to lie on the gilded surface. Lastly, some artists think that they give an additional lustre to their gilt-work by dipping it in a liquor prepared by boiling some yellow materials, as sulphur, orpiment, or turmeric. The only advantage of this operation is, that a part of the yellow matter, as the sulphur or turmeric, remains in some of the hollows of the carved work, in which the gilding is apt to be more imperfect, and to which it gives a rich and solid appearance.

Iron cannot be gilt by amalgamation, unless, as it is said, it be previously coated with copper by dipping in a solution of blue vitriol. Iron may also receive a golden coat from a saturated solution of gold in aqua-regia, mixed with spirit of wine, the iron having a greater affinity with the acid, from which it therefore precipitates the gold. Whether any of these two methods be applicable to use, is uncertain: but the method commonly employed of fixing gold upon iron is that above mentioned, of burnishing gold-leaf upon this metal when heated so as to become blue; and the operation will be more perfect if the surface has been previously scratched or graved.

Another method is mentioned by authors of gilding upon metals, and also upon earthen ware, and upon glass; which is, to fuse gold with regulus of antimony, to pulverise the mass which is sufficiently brittle to admit that operation, to spread this powder upon the piece to be gilt, and expose it to such a fire that the regulus may be evaporated, while the gold remains fixed. The inconveniences of this method, according to Dr Lewis, are, that the powder does not adhere to the piece, and cannot be equally spread; that part of the gold is dissipated along with the regulus; that glass is fusible with the heat necessary for the evaporation of regulus of antimony; and that copper is liable to be corroded by the regulus, and to have its surface rendered uneven.

On the subject of gilding by amalgamation Dr Lewis has the following remarks. "There are two principal inconveniences in this business: One, that the workmen are exposed to the fumes of the mercury, and generally, sooner or later, have their health greatly impaired by them: the other, the loss of the mercury; for tho' part of it is said to be detained in cavities made in the chimney for that purpose, yet the greatest part of it is lost. From some trials I have made, it appeared that both these inconveniences, particularly the first and most considerable one, might in good measure be avoided, by means of a furnace of a due construction. If the communication of a furnace with its chimney, instead

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Improvements by
Dr Lewis

Phil. Com.
of Arts.

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Gilead
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Gill.

The powders for this purpose may be made, 1. By grinding gold-leaf with honey, which is afterwards to be washed away with water. 2. By distilling to dryness a solution of gold in aqua-regia. 3. By evaporating the mercury from an amalgam of gold, taking care to stir well the mass near the end of the process. 4. By precipitating gold from its solution in aqua-regia by applying to it a solution of green vitriol in water, or some copper, and perhaps some other metallic substances.

GILEAD, the son of Machir, and grandson of Manasseh, had his inheritance allotted him in the mountains of Gilead, from whence he took his name. The mountains of Gilead were part of that ridge which runs from mount Lebanon southward, on the east of the Holy Land; gave their name to the whole country which lies on the east of the sea of Galilee, and included the mountainous region called in the New Testament *Trachonitis*. Jeremiah (xxii. 6.) seems to say, that Gilead begins from mount Libanus. 'Thou art Gilead unto me, and the head of Lebanon.' Jacob, at his return from Mesopotamia, came in six days to the mountains of Gilead (Gen. xxxi. 21, &c.) where this patriarch, with Laban his father-in-law, raised a heap of stones, in memory of their agreement and covenant, and called it *Galeed*, i. e. "an heap of witness," and which Laban called *Jegar-sahadutha*. These mountains were covered with a sort of trees abounding with gum, called the *balm of Gilead*, which the scripture commends much. (Jer. viii. 21. xvi. 11. li. 8.) The merchants who bought Joseph came from Gilead, and were carrying balm into Egypt. (Gen. xxxvii. 25.)

The Gileadites being invaded by the Ammonites, &c. chose Jephthah for their general, who vanquished all their enemies.

Balm of GILEAD. See AMYRIS.

GILGAL (anc. geog.), a place between Jericho and Jordan, noted for the first encampment of the Israelites on this side Jordan, about a mile from Jericho. It sometimes also denotes Galilee, (Joshua xii. 23.)

GILL (John), D. D. a Protestant dissenting minister of the Baptist denomination, and the son of Edward and Elizabeth Gill, was born at Kettering in Northamptonshire, November 23. 1697. At a very early period of life, his father, who was a deacon of the Baptist church at Kettering, discovered in him an uncommon capacity for learning; and his ability for literary pursuits was afterwards evidenced by such rapid progress in whatever became the object of tuition, that it was found necessary to remove him from the school in which his striking talents were first manifested, and to place him in one more favourable to his improvement. He was therefore sent to a grammar school in the neighbourhood; where he very soon surpassed those boys who were much his seniors in age and as pupils. At this school he continued till he arrived at his 11th year; where, besides going through the common school-books, he read most of the Latin classics, and made very considerable proficiency in the Greek language.

Mr Gill's celebrity as a scholar, and his strong attachment to books, were soon observed by the neighbouring clergy, who frequently met and conversed with him at a bookseller's shop, to which he at every opportunity resorted for the purpose of reading; and

indeed such was his application to books, that it became a proverbial saying among the common people, "Such a thing is as certain, as that John Gill is in the bookseller's shop."

He left the grammar school, however, early in life. This was occasioned by the imperious conduct of his master, who insisted that the children of dissenting parents should, with other scholars that belonged to the establishment, attend him to church on week days during the performance of divine service. The dissenters considered this requisition as a stretch of power to which his engagements with them gave no claim; and as it was virtually making conformity a test by which his pupils were to expect the benefits of tuition, they resented his conduct; and the children of those parents that were in affluent circumstances were removed to seminaries where the same advantages might be obtained without being subject to the impositions of clerical bigotry. But as the parents of Mr Gill had it not in their power to confer on him the same privilege, the same steps could not be taken to facilitate his advancement in learning. To pave the way, however, for the completion of his studies, efforts were made by several ministers, of different denominations, to get him upon one or other of the funds in London. For this purpose, specimens of his progress in the different branches of literature were transmitted to the metropolis: in answer to which it was objected, "that he was too young, and that should he continue, as it might be expected he would, to make such rapid advances in his studies, he would go through the common circle before he could be capable of taking care of himself, or of being employed in any public service." But these formidable objections were of no weight with our young scholar: his love of learning was unconquerable. Insurmountable difficulties, it is true, obstructed the way in which literary eminence is usually acquired; but these difficulties could neither repress his ardent desire of knowledge, nor damp the zeal and application that had marked his former studies. For though his time was daily devoted to the business of his father; yet he had so far improved the hours of leisure, as to be able, before he arrived at his 19th year, to read all the Greek and Latin authors that fell in his way. He studied logic, rhetoric, moral and natural philosophy; and learnt the Hebrew language, so as to read it with ease, without any other assistance than Buxtorf's grammar and lexicon.

Neither the pursuit of learning, however, nor the other necessary avocations incumbent on Mr Gill, could eradicate those religious impressions received in early life. On November 1. 1716, he made a public profession of his faith before the Baptist church at Kettering, and was baptized the same day by Mr Thomas Wallis. Of this church Mr Gill had not been long a member before he was called to the work of the ministry: soon after which, he removed to Higham-Ferrers, with a view to pursue his studies under the direction of Mr Davis; but his stay at this place was soon interrupted by an invitation from London in 1719, to preach to the Baptist church in Horselydown, over which he was the same year, being the 22d of his age, ordained pastor; which office he sustained upwards of 51 years.

Mr Gill had not been long in London before rabbinical

Gill.

Gill. binical learning, of which he had before considerable knowledge, became an object of pursuit. To facilitate his progress through the intricacies of this labyrinth, he contracted an acquaintance with one of the most learned Jewish rabbies. He read the Targums, the Talmuds, the Rabbot; their ancient commentaries, the book Zohar, and whatever else of this kind he was able to procure. Of the Oriental languages he made himself a complete master: in short, there was no branch of knowledge that could either enlarge or enrich biblical learning, which, however difficult, was not attempted and attained: and it may be truly asserted, that in this line he had but few equals, and that the annals of literature do not exhibit a character by whom he was excelled.

In 1748 Mr Gill published a commentary on the New Testament in three vols folio. The immense reading and learning discoverable in this arduous work, attracted the attention of the Marischal College and University of Aberdeen; and procured for him, without either his solicitation or his knowledge, a diploma, creating him Doctor in divinity. This intelligence was communicated to the Doctor in the most handsome terms by the professors Osborn and Pollock; who declared, "that on account of his knowledge of the scriptures, of the Oriental languages, and of Jewish antiquities, of his learned defence of the scriptures against Deists and Infidels, and the reputation gained by his other works; the university had, without his privacy, unanimously agreed to confer on him the degree of Doctor in divinity."

Dr Gill's sentiments, as a divine, were throughout Calvinistic: "And perhaps no man (says the Reverend Mr Toplady, a minister in the church of England) since the days of Austin, has written so largely in defence of the system of grace; and certainly no man has treated that momentous subject in all its branches, more closely, judiciously, and successfully. What was said of Edward the black prince, that he never fought a battle which he did not win; what has been remarked of the great Duke of Marlborough, that he never undertook a siege which he did not carry; may be justly accommodated to our great philosopher and divine; who, so far as the distinguishing doctrines of the gospel are concerned, never besieged an error which he did not force from its strongholds, nor ever encountered an adversary whom he did not baffle and subdue. His learning and labours, if exceedable, were exceeded only by the invariable sanctity of his life and conversation. From his childhood to his entrance on the ministry, and from his entrance on the ministry to the moment of his dissolution, not one of his most inveterate opposers was ever able to charge him with the least shadow of immorality. Himself, no less than his writings, demonstrated that the doctrine of grace does not lead to licentiousness. Those who had the honour and happiness of being admitted into the number of his friends, can go still farther in their testimony. They know that his moral demeanor was more than blameless; it was from first to last consistently exemplary. And indeed an undeviating consistency, both in his views of evangelical truths, and in his obedience as a servant of God, was one of those qualities by which his cast of character was eminently marked. He was in every respect

a burning and a shining light: Burning with love to God, to truth, and to souls; shining as an example to believers, in word, in faith, in purity, a pattern of good works, and a model of all holy conversation and godliness; and while true religion and sound learning have a single friend remaining in the British empire, the works and name of Gill will be precious and revered."

He died at Camberwell, October 14. 1771, aged 73 years 10 months and 10 days. In 1718 the Doctor married Mrs Elizabeth Negus; by whom he had many children, two of whom only survived him. Mrs Gill died in 1764.

His works are, A Commentary on the Old and New Testament, in 9 vols folio. A Body of Divinity in 3 vols quarto. The Cause of God and Truth, 4 vols octavo. A Treatise concerning the Prophecies of the Old Testament respecting the Messiah. A Dissertation on the antiquity of the Hebrew Language, Letters, Vowel-Points, and Accents. Sermons on the Canticles, folio; besides a great number of sermons and controversial pieces on different subjects.

GILL, a measure of capacity, containing a quarter of an English pint.

GILLS, or BRANCHIÆ of fishes. See *COMPARATIVE Anatomy*, n° 160.

GILLINGHAM, a parish in the county of Dorsetshire, on the river Stour, near the forest of its own name; where, anno 1016, king Edmund Ironside vanquished the Danes. It is one of the largest parishes in the county, being 4½ miles in circuit, containing 64,000 acres. It lies on the borders of Wilts and Somerset, 4 miles N. W. of Shaftsbury. It has a manufacture of linen, but the chief produce is grazing and the dairies. Near it are the traces of an ancient residence of Norman or Saxon kings, 320 feet long and 240 broad, surrounded by a rampart of earth. Henry I. resided here, and king John repaired it at the expence of the county. Edward I. spent his Christmas here in 1270; but the whole of the materials are removed, and the foundation of the house only can be traced, which was in the form of the letter L, in length 180 feet by 80 broad, and the foot of the letter 48 by 40. The area of the house containing 168,000 square feet. It stood half a mile from the church, on the road to Shafton, encompassed by a moat, now dry, in some places 9 feet deep and 20 broad. The rampart appears to have been 30 feet thick. Here is a free school, a large old building, and a workhouse, as well as two stone bridges. In 1694 it received damage of near 4000l. by a fire. Near it is Gillingham forest, four miles long and one mile broad. The church is a large ancient fabrick.

GILLINGHAM, a parish of Kent, three miles below Chatham, and on the same side of the Medway. Part of Chatham-dock is in this parish; and here is a castle well furnished with guns that commands the river, there being no less than 170 embrasures for cannon; which would stop the progress of any enemy that should happen to make way by Sheerness-fort, before they could reach Chatham. Here are also copperas works. At this place 600 Norman gentlemen, who came over in the retinue of the two princes Alfred and Edward, were all barbarously murdered by earl Godwin. It was in remote times the property of the archbishop of Canterbury,

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Canterbury, who had here an elegant palace, the old hall of which is now converted to a barn: it is built principally of flint, but the windows are filled up with brick. Near it are the remains of the chapel, &c. and a great part of the whole of its original outer walls may be traced.

GILOLO, a large island of the Pacific Ocean, lying between 1° S. Lat. and 2° N. Lat. and between 125° and 128° E. Long. It belongs to the Dutch; but does not produce any of the fine spices, tho' it lies in the neighbourhood of the spice-islands. The natives are fierce and cruel savages.

GILPIN (Bernard), rector of Houghton, distinguished by his extraordinary piety and hospitality, was descended from an ancient and honourable family in Westmoreland, and born in 1517. As he was bred in the Catholic religion, so he for some time defended it against the reformers, and at Oxford held a disputation with Hooper afterward bishop of Worcester and martyr for the Protestant faith; but was staggered in another disputation with Peter Martyr, and began seriously to examine the contested points by the best authorities. Thus, being presented to the vicarage of Norton in the diocese of Durham, he soon resigned it, and went abroad to consult eminent professors on both sides; and after three years absence returned a little before the death of queen Mary, satisfied in the general doctrines of the reformation. He was kindly received by his uncle Dr Tonstall, bishop of Durham; who soon after gave him the archdeaconry of Durham, to which the rectory of Ellington was annexed. When repairing to his parish, though the persecution was then at its height, he boldly preached against the vices, errors, and corruptions of the times, especially in the clergy, on which a charge consisting of 13 articles was drawn up against him, and presented in form to the bishop. But Dr Tonstall found a method of dismissing the cause in such a manner as to protect his nephew, without endangering himself, and soon after presented him to the rich living of Houghton le Spring. He was a second time accused to the bishop, and again protected; when his enemies, enraged at this second defeat, laid their complaint before Dr Bonner, bishop of London; who immediately gave orders to apprehend him. Upon which Mr Gilpin bravely prepared for martyrdom; and ordering his house-steward to provide him a long garment that he might make a decent appearance at the stake, set out for London. Luckily, however, he broke his leg on the journey; which protracted his arrival until the news of the queen's death freed him from all further apprehensions. Being immediately set at liberty, he returned to Houghton, where he was received by his parishioners with the sincerest joy.

Upon the deprivation of the Popish bishops, he was offered the see of Carlisle, which he declined; and confining his attention to his rectory, discharged all the duties of his function in the most exemplary manner. To the greatest humanity and courtesy, he added an unwearied application to the instruction of those under his care. He was not satisfied with the advice he gave in public, but used to instruct in private; and brought his parishioners to come to him with their doubts and difficulties. He had a most engaging manner towards those whom he thought well-disposed: nay, his very

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reproof was so conducted, that it seldom gave offence; the becoming gentleness with which it was urged, made it always appear the effect of friendship. Thus, with unceasing assiduity, did he employ himself in admonishing the vicious, and encouraging the well-intentioned; by which means, in a few years, he made a greater change in his neighbourhood than could well have been imagined. A remarkable instance, what reformation a single man may effect, when he hath it earnestly at heart!

But his hopes were not so much in the present generation, as in the succeeding. It was an easier task, he found, to prevent vice, than to correct it; to form the young to virtue, than to amend the bad habits of the old. He employed much of his time, therefore, in endeavouring to improve the minds of the younger part of his parish; suffering none to grow up in an ignorance of their duty; but pressing it as the wisest part to mix religion with their labour, and amidst the cares of this life to have a constant eye upon the next. He attended to every thing which might be of service to his parishioners. He was very assiduous in preventing all law-suits among them. His hall is said to have been often thronged with people, who came to him about their differences. He was not indeed much acquainted with law; but he could decide equitably, and that satisfied: nor could his sovereign's commission have given him more weight than his own character gave him.

His hospitable manner of living was the admiration of the whole country. He spent in his family every fortnight 40 bushels of corn, 20 bushels of malt, and a whole ox; besides a proportionable quantity of other kinds of provision. Strangers and travellers found a cheerful reception. All were welcome that came; and even their beasts had so much care taken of them, that it was humorously said, "If a horse was turned loose in any part of the country, it would immediately make its way to the rector of Houghton's."

Every Sunday, from Michaelmas till Easter, was a sort of public day with him. During this season he expected to see all his parishioners and their families. For their reception, he had three tables well covered: the first was for gentlemen, the second for husbandmen and farmers, and the third for day-labourers. This piece of hospitality he never omitted, even when losses, or a scarcity of provision, made its continuance rather difficult to him. He thought it his duty, and that was a deciding motive. Even when he was absent from home, no alteration was made in his family-expenditures; the poor were fed as usual, and his neighbours entertained.

But notwithstanding all this painful industry, and the large scope it had in so extended a parish, Mr Gilpin thought the sphere of his benevolence yet too confined. It grieved him extremely to see every where, in the parishes around him, so great a degree of ignorance and superstition, occasioned by the shameful neglect of the pastoral care in the clergy of those parts. These bad consequences induced him to supply, as far as he could, what was wanting in others. For this purpose, every year he used regularly to visit the most neglected parishes in Northumberland, Yorkshire, Cheshire, Westmoreland, and Cumberland; and that his own parish in the mean time might not suffer, he

Gilpin.

pin. he was at the expence of a constant assistant. In each place he staid two or three days; and his method was, to call the people about him, and lay before them, in as plain a way as possible, the danger of leading wicked or even careless lives; explaining to them the nature of true religion; instructing them in the duties they owed to God, their neighbour, and themselves: and showing them how greatly a moral and religious conduct would contribute to their present as well as future happiness.

As Mr Gilpin had all the warmth of an enthusiast, though under the direction of a very calm and sober judgment, he never wanted an audience, even in the wildest parts; where he roused many to a sense of religion, who had contracted the most inveterate habits of inattention to every thing of a serious nature. And wherever he came, he used to visit all the gaols and places of confinement; few in the kingdom having at that time any appointed minister. And by his labours, and affectionate manner of behaving, he is said to have reformed many very abandoned persons in those places. He would employ his interest likewise for such criminals whose cases he thought attended with any hard circumstances, and often procured pardons for them.

There is a tract of country upon the border of Northumberland, called *Readf-dale* and *Tine-dale*, of all barbarous places in the north, at that time the most barbarous. Before the Union, this place was called the *debateable land*, as subject by turns to England and Scotland, and the common theatre where the two nations were continually acting their bloody scenes. It was inhabited by a kind of desperate banditti, rendered fierce and active by constant alarms: they lived by theft, used to plunder on both sides of the barrier; and what they plundered on one, they exposed to sale on the other; by that means escaping justice. And in this dreadful country, where no man would even travel that could help it, Mr Gilpin never failed to spend some part of every year.

He generally chose the Christian holidays for his journey, because he found the people at that season most disengaged, and most easily assembled. He had set places for preaching, which were as regularly attended as the assize-towns of a circuit. If he came where there was a church, he made use of it: if not, of barns, or any other large building; where great crowds of people were sure to attend him, some for his instructions, and others for his charity.—This was a very difficult and laborious employment. The country was so poor, that what provision he could get, extreme hunger only could make palatable. The inclemency of the weather, and the badness of the roads through a mountainous country, and at that season covered with snow, exposed him likewise often to great hardships. Sometimes he was overtaken by the night, the country being in many places desolate for several miles together, and obliged to lodge out in the cold. At such times, we are told, he would make his servant ride about with his horses, whilst himself on foot used as much exercise as his age and the fatigues of the preceding day would permit. All this he cheerfully underwent; esteeming such services well compensated by the advantages which he hoped might accrue from them to his unimstructed fellow-creatures.

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The disinterested pains he took among these barbarous people, and the good offices he was always ready to do them, drew from them the warmest and sincerest expressions of gratitude. Indeed, he was little less than adored among them, and might have brought the whole country almost to what he pleased. One instance that is related, shows how greatly he was revered. By the carelessness of his servants, his horses were one day stolen. The news was quickly propagated, and every one expressed the highest indignation at the fact. The thief was rejoicing over his prize, when, by the report of the country, he found whose horses he had taken. Terrified at what he had done, he instantly came trembling back, confessed the fact, returned the horses, and declared he believed the devil would have seized him directly, had he carried them off knowing them to have been Mr Gilpin's.

We have already taken notice of Mr Gilpin's uncommonly generous and hospitable manner of living. The value of his rectory was about 400 l. a-year: an income, indeed, at that time very considerable, but yet in appearance very unproportionate to the generous things he did: indeed, he could not have done them, unless his frugality had been equal to his generosity. His friends, therefore, could not but wonder to find him, amidst his many great and continual expences, entertain the design of building and endowing a grammar-school: a design, however, which his exact economy soon enabled him to accomplish, though the expence of it amounted to upwards of 500 l. His school was no sooner opened, than it began to flourish; and there was so great a resort of young people to it, that in a little time the town was not able to accommodate them. He put himself, therefore, to the inconvenience of fitting up a part of his own house for that purpose, where he seldom had fewer than 20 or 30 children. Some of these were the sons of persons of distinction, whom he boarded at easy rates: but the greater part were poor children, whom he not only educated, but clothed and maintained: he was at the expence likewise of boarding in the town many other poor children. He used to bring several every year from the different parts where he preached, particularly *Readf-dale* and *Tine-dale*; which places he was at great pains in civilizing, and contributed not a little towards rooting out that barbarism which every year prevailed less among them.

As to his school, he not only placed able masters in it, whom he procured from Oxford, but himself likewise constantly inspected it. And, that encouragement might quicken the application of his boys, he always took particular notice of the most forward: he would call them *his own scholars*, and would send for them often into his study, and there instruct them himself. One method used by him to fill his school was a little singular. Whenever he met a poor boy upon the road, he would make trial of his capacity by a few questions; and if he found it such as pleased him, he would provide for his education. And besides those whom he sent from his own school to the universities, and there wholly maintained; he would likewise give to others, who were in circumstances to do something for themselves, what farther assistance they needed. By which means he induced many parents to allow their children a liberal education, who otherwise would not have done

Gilpin. it. And Mr Gilpin did not think it enough to afford the means only of an academical education to these young people, but endeavoured to make it as beneficial to them as he could. He still considered himself as their proper guardian; and seemed to think himself bound to the public for their being made useful members of it, as far as it lay in his power to make them so. With this view he held a punctual correspondence with their tutors; and made the youths themselves frequently write to him, and give him an account of their studies. So solicitous indeed was he about them, knowing the many temptations to which their age and situation exposed them, that once every other year he generally made a journey to the universities to inspect their behaviour. And this uncommon care was not unrewarded; for many of his scholars became ornaments to the church, and exemplary instances of piety.

To the account that hath been already given of Mr Gilpin's hospitality and benevolence, the following particulars may be added. Every Thursday throughout the year, a very large quantity of meat was dressed wholly for the poor; and every day they had what quantity of broth they wanted. Twenty-four of the poorest were his constant pensioners. Four times in the year a dinner was provided for them; when they received from his steward a certain quantity of corn, and a sum of money: and at Christmas they had always an ox divided among them.

Whenever he heard of any in distress, whether of his own parish or any other, he was sure to relieve them. In his walks abroad, he would frequently bring home with him poor people, and send them away clothed as well as fed. He took great pains to inform himself of the circumstances of his neighbours, that the modesty of the sufferer might not prevent his relief. But the money best laid out was, in his opinion, that which encouraged industry. It was one of his greatest pleasures to make up the losses of his laborious neighbours, and prevent their sinking under them. If a poor man had lost a beast, he would send him another in his room: or if any farmer had had a bad year, he would make him an abatement in his tythes.—Thus, as far as he was able, he took the misfortunes of his parish upon himself; and, like a true shepherd, exposed himself for his flock. But of all kinds of industrious poor, he was most forward to assist those who had large families: such never failed to meet with his bounty, when they wanted to settle their children in the world.

In the distant parishes where he preached, as well as in his own neighbourhood, his generosity and benevolence were continually showing themselves; particularly in the desolate parts of Northumberland. "When he began his journey," says an old manuscript life of him, "he would have 10 pounds in his purse; and, at his coming home, he would be 20 nobles in debt, which he would always pay within a fortnight after."—In the gaols he visited, he was not only careful to give the prisoners proper instructions, but used to purchase for them likewise what necessaries they wanted.

Even upon the public road, he never let slip an opportunity of doing good. He has often been known to take off his cloak, and give it to an half-naked traveller: and when he has had scarce money enough in

his pocket to provide himself a dinner, yet would he give away part of that little, or the whole, if he found any who seemed to stand in need of it.—Of this benevolent temper, the following instance is preserved. One day returning home, he saw in a field several people crowding together; and judging something more than ordinary had happened, he rode up, and found that one of the horses in a team had suddenly dropped down, which they were endeavouring to raise; but in vain, for the horse was dead. The owner of it seemed much dejected with his misfortune; and declaring how grievous a loss it would be to him, Mr Gilpin bade him not be disheartened: "I'll let you have (says he), honest man, that horse of mine," and pointed to his servant's.—"Ah! master (replied the countryman), my pocket will not reach such a beast as that." "Come, come (said Mr Gilpin), take him, take him; and when I demand my money, then thou shalt pay me."

This worthy and excellent divine, who merited and obtained the glorious titles of *the Father of the Poor*, and *the Apostle of the North*, died in 1583, in the 66th year of his age.

GILTHEAD, in ichthyology. See SPARUS.

GIN. See GENEVA.

GIN, in mechanics, a machine for driving piles, fitted with a windlass and winches at each end, where eight or nine men heave, and round which a rope is reeved that goes over the wheel at the top: one end of this rope is seized to an iron-monkey, that hooks to a beetle of different weights, according to the piles they are to drive, being from eight to thirteen hundred weight; and when hove up to a cross-piece, near the wheel, it unhooks the monkey, and lets the beetle fall on the upper end of the pile, and forces the same into the ground: then the monkey's own weight overhauls the windlass, in order for its being hooked again to the beetle.

GINGER, the root of a species of amomum. See AMOMUM.

GINGIDIUM, in botany: A genus of the digynia order, belonging to the pentandria class of plants. The calyx is an involucre, with about six linear leaves; the corolla consists of five oval-lanceolated petals; the stamina are five-filaments; the antheræ roundish; the pericarpium an ovato-truncated fruit, with eight striæ; there are two striated seeds, in some places plane, and in others convex.

GINGIRO, or **ZINDERO**, a small territory of Africa to the south of Abyssinia; being separated from it by the river Zebec, by which it is also almost entirely surrounded. This river is extremely large, having more water than the Nile, and being much more rapid; so that, during the rainy season, it would be altogether impassable, were it not for the large rocks which are in its channel. The extreme difficulty which occurs in passing this river, however, is the means of preserving the kingdom of Gingiro, which would otherwise be conquered in a single season by the Galla.

The most remarkable particular with regard to this kingdom is, that the sovereign is a professed votary of the devil. "This superstition (says Mr Bruce) reaches down all the western side of the continent on the Atlantic ocean, in the countries of Congo, Angola, and Benin. In spite of the firmest foundation in true philo-

Gingiro
||
Glymus

philosophy, a traveller, who decides from the information and investigation of facts, will find it very difficult to treat these appearances as absolute fictions, or as owing to the superiority of cunning of one man in over-reaching another. For my own part, I confess, I am equally at a loss to assign reasons for disbelieving the fiction on which their pretensions to some preternatural information are founded, as to account for them by the operation of ordinary courses."

In this kingdom every thing is conducted, or pretended to be conducted, by magic; and all those slaves, which in other African countries are sold to Europeans, are here sacrificed to the devil, human blood being a necessary part in all their accursed solemnities. "How far (says Mr Bruce) this reaches to the southward, I do not know; but I look upon this to be the geographical bounds of the reign of the devil on the north side of the equator in the peninsula of Africa."

With regard to this country, very little farther is known than some of the customs of the people transiently picked up by the Jesuit missionaries in Abyssinia. From them we learn, that the kingdom is hereditary in one family, though it does not regularly descend to the eldest son, the king being chosen by the nobles; in which they resemble their neighbours the Abyssinians. When the king dies, his body is wrapped in a fine cloth, and a cow is killed. The body so wrapped up is next inclosed in the cow's skin; and all the princes of the royal family fly and hide themselves in the bushes, while those who are intrusted with the election enter the thickets, beating about every where as if for game. At last a bird of prey, called in their language *liber*, appears, and hovers over the person destined to be king; crying and making a great noise without quitting his station. By this means the person destined to be elected is found out, surrounded, as is reported, by lions, tigers, panthers, and other wild beasts; all which are supposed to be brought by the power of magic or of the devil.—After the king is found, he flies upon those who came in quest of him with great fury, killing and wounding as many as he can reach, until at last he is dragged to the throne whether he will or not. One particular family have the privilege of conducting him to the throne; and if they should not happen to find him at first, they have a right to take him out of the hands of those who did so; and thus another battle ensues before the vacant throne can be filled. Lastly, before he enters his palace, two men must be killed; one at the foot of a tree by which the house is supported; and the other at the threshold of the door, which is besmeared with the blood of the victim. It is the particular privilege of one family to afford these victims; and so far are they from seeking to avoid this fate, that they glory in the occasion, and willingly offer themselves to meet it. This last particular, Mr Bruce says he had in Abyssinia from people coming from *Gingiro*.

GINGIVÆ, the gums. See GUMS.

GINGLYMUS, in anatomy, one of the species of articulation. It is that jointure of the bones where each bone mutually receives the other; so that each bone both receives and is received. See ANATOMY, n° 2.

GINKGO, the MADEN-HAIR-TREE. See MAURITIA.

GINORA, in botany: A genus of the monogynia order, belonging to the dodecandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is cleft into six parts; the petals six; the capsule unilocular, quadrivalved, coloured, and polyspermous.

GINSENG. See PANAX.

GIOIA (Flavio), of Amalfi, in the kingdom of Naples, the celebrated mathematician; who, from his knowledge of the magnetic powers, invented the mariner's compass, by which the navigation of the Europeans was extended to the most distant regions of the globe: before this invention, navigation was confined to coasting. The king of Naples being a younger branch of the royal family of France, he marked the north point with a fleur de lis, in compliment to that country. It is said the Chinese knew the compass long before; be this as it may, the Europeans are indebted to Gioia for this invaluable discovery. He flourished A. D. 1300.

GIORDANO (Luca.) See JORDANO.

GIORGIONE, so called from his comely aspect, was an illustrious Venetian painter, born in 1478. He received his first instructions from Giovanni Bellino; but studying afterwards the works of Leonardo da Vinci, he soon surpassed them both, being the first among the Lombards who found out the admirable effects of strong lights and shadows. Titian became his rival in this art; and was so careful in copying the life, that he excelled Giorgione in discovering the delicacies of nature, by tempering the boldness of his colouring. The most valuable piece of Giorgione in oil is that of Christ carrying his cross, now in the church of San Rovo in Venice; where it is held in great veneration. He died of the plague young, in 1511.

GIOSEPPINO, an eminent painter, so called by way of contraction from *Giuseppe d'Arpino* the town of Naples where he was born in 1560. Being carried to Rome very young, and employed by painters then at work in the Vatican to grind their colours, he soon made himself master of the elements of design, and by degrees grew very famous. His wit and humour gained him the favour of popes and cardinals, who found him business in plenty. Gregory XIII. showed him great respect; and Louis XIII. of France made him a knight of the order of St Michael. By the force of a happy genius he acquired a light and agreeable manner of designing; though it is remarked by De Piles, that he degenerated into a style which neither partook of true nature nor of the antique. His battles in the Capitol are the most esteemed of all his pieces. He died at Rome in 1640.

GIOTTO, an ingenious painter, sculptor, and architect of Florence, born in 1276. He was the disciple of Cimabue; but far superior to his master in the air of his heads, the attitude of his figures, and in the tone of his colouring; but could not express liveliness in the eyes, tenderness in the flesh, or strength in the muscles of his naked figures. He was principally admired for his works in mosaic; the best of which is over the grand entrance of St Peter's church at Rome.

Giraffe
||
Girdle.

The observation of Alberti on that piece is, that in the ship of Giotto, the expression of fright and amazement of the disciples at seeing St Peter walk upon the water is so excellent, that each of them exhibits some characteristic sign of his terror. His death happened in 1336, and the city of Florence honoured his memory with a statue of marble over his tomb.

GIRAFFE, in zoology. See CERVUS.

GIRALD (Barry), or *Giraldus Cambrensis*. See BARRY.

GIRALDI (Lilio Gregorio), an ingenious critic, and one of the most learned men that modern Italy has produced, was born at Ferrara in 1479. He was at Rome when it was plundered by the emperor Charles V.; and having thus lost all he had, and being tormented by the gout, he struggled through life with ill fortune and ill health. He wrote, nevertheless, 17 performances, which were collected and published at Basil in 2 vols folio in 1580, and at Leyden in 1696. Authors of the first rank have bestowed the highest eulogies on Giraldus; particularly Casaubon and Thuanus.

GIRALDI (John Baptist Cintio), an Italian poet of the same family with the foregoing Lilio, was born in 1504. He was secretary to the duke of Ferrara, and afterwards became professor of rhetoric at Pavia. He died in 1573. His works, which consist chiefly of tragedies, were collected and published at Venice by his son Celso Giraldi, in 1583; and some scruple not to rank him among the best tragic writers Italy has produced.

GIRARDON (Francis), a celebrated French architect and sculptor, born at Troyes in 1627. Louis XIV. being informed of his great talents, sent him to Rome with a pension of 1000 crowns. At his return into France, he laboured for the royal palaces, and the gardens of Versailles and Trianon; where there are many of his works executed in bronze and in marble, from the designs of Charles le Brun. The mausoleum of cardinal de Richelieu, in the Sorbonne, and the equestrian statue of Louis XIV. at the Place de Vendome, where the statue and horse are cast in one piece, pass for his most excellent performances. Girardon was professor, rector, and chancellor, of the Academy of Painting and Sculpture; and had the post of inspector-general of all the works done in sculpture. He died in 1715.

GIRDERS, in architecture, the largest pieces of timber in a floor. Their ends are usually fastened into the summers, or breast-summers; and the joists are framed in at one end to the girders.

By the statute for rebuilding London, no girder is to lie less than ten inches into the wall, and their ends to be always laid in loam, &c.

GIRDLE (*Cingulus* or *Zona*), a belt or band of leather or other matter, tied about the reins to keep that part more firm and tight.

It was anciently the custom for bankrupts and other insolvent debtors to put off and surrender their girdle in open court. The reason of this was, that our ancestors used to carry all their necessary utensils, as purse, keys, &c. tied to the girdle; whence the girdle became a symbol of the estate. History relates, that the widow of Philip I. duke of Burgundy, renounced

her right of succession by putting off her girdle upon the duke's tomb.

The Romans always wore a girdle to tuck up the tunica when they had occasion to do any things: this custom was so general, that such as went without girdles, and let their gowns hang loose, were reputed idle, dissolute, persons.

Maiden's or Virgins GIRDLE. It was the custom among the Greeks and Romans for the husband to untie his bride's girdle. Homer, lib. xi. of his *Odyssæ*, calls the girdle *ἡ ἀρτεμὶνὸν ζώνην*, *maid's girdle*. Festus relates, that it was made of sheep's wool, and that the husband untied it in bed: he adds, that it was tied in the Herculean knot; and that the husband unloosed it, as a happy presage of his having as many children as Hercules, who at his death left seventy behind him.

The poets attribute to Venus a particular kind of girdle called *cestus*, to which they annexed a faculty of inspiring the passion of love.

GIRGASHITES, or GERGESENES, an ancient people of the land of Canaan, whose habitation was beyond the sea of Tiberias; where we find some footsteps of their name in the city of *Gergesa*, upon the lake of Tiberias. The Jewish doctors inform us, that when Joshua first came into the land of Canaan, the Girgashites took a resolution rather to forsake their country than submit to the Hebrews, and accordingly retired into Africa. Nevertheless, it is certain that a good number of them staid behind, since Joshua (xxiv. 11.) informs us that he subdued the Girgashites, and they whom he overcame were certainly on this side Jordan.

GIRGENTI, a town of Sicily, which occupies part of the site of the ancient *Agrirentum*. It has only one street fit for carriages. It is inhabited by 15,000 persons; but has no remarkable buildings or works of art that deserve mention: the only antiquities to be seen were a Latin inscription of the time of the Antonines, as is pretended, relative to some association between Agrirentum and Lilybæum; and a piece of ancient masonry in the foundations of a church pretended to be the remains of a temple of Jupiter. At some distance, on the old ground in the vale, stands the cathedral, a clumsy building patched up by barbarous architects with various discordant parts. This church is enriched with no works of modern painters or sculptors that claim any title to praise, but the baptismal font is made out of an ancient sarcophagus faced with very beautiful basso relievo. This see is the richest in Sicily, but has the character of being less enlightened and polished than the rest of the island. Among the curiosities belonging to the cathedral is an Etruscan vase of rare size and preservation. There are also some golden pateras of extreme rarity. The monastery of San Nicolo stands on a little eminence in the centre of the old city, admirably situated. The range of hills towards the south east sinks gradually, so as to admit a noble reach of sea and of plain, terminated on each side by thick groves of fruit-trees. Above appear the remains of ancient grandeur, wonderfully contrasted with the humble straw cottages built at their feet. In the orchard of this convent is a square building with pilasters, which is supposed to have been part of the palace of the Roman prætor.

Gir-

Gironne
Giula.

Girgenti has the convenience of a port; for which, however, it is less indebted to its natural situation than to the recent assistance of art. The harbour is formed by means of a pier carried out in three sides of an octagon, with a battery at the head; the lighthouse is to be erected on the cliffs on shore, as there is no possibility of raising it high enough on the mole without danger of sinking. The work is admirable as to strength and neatness, but the intention of creating a safe and complete haven has not been fully answered; the Scirocco commands it entirely, and drives in great quantities of sand, which it is feared will in time choke up the port; even now ships of burden find it difficult to get in, but the Caricatore is considerable, and the magazines in the rocks along the shore are very spacious.

GIRONNE, or GIRONNY, in heraldry, a coat of arms divided into girones, or triangular figures, meeting in the centre of the shield, and alternately colour and metal.

GISCO, son of Himilco the Carthaginian general, was banished from Carthage by the influence of his enemies. Being afterwards recalled, he was made general in Sicily against the Corinthians, about 309 years before the Christian era, and by his success and intrepidity he obliged the enemies of his country to sue for peace. See CARTHAGE.

GISBOROUGH, a town of England, in the West Riding of Yorkshire, on the road from Whitby to Durham, 224 miles from London, and 4 miles from the mouth of the Tees, where is a bay and harbour for ships. It had formerly an abbey, which was once the common burial-place of the nobility of these parts, and its church by the ruins seems to have been equal to the best cathedrals in England. The soil, besides its fertility in pasture and a constant verdure adorned with plenty of field-flowers almost all the year, has earths of sundry colours, some iron, and mines of alum, which were first discovered in the reign of king James I. and have been since very much improved. Sir Paul Pindar, who first farmed them, paid rents to the king 12,500 l. to the Earl of Musgrave 1640 l. and to Sir William Penniman 600 l. and had moreover 800 men by sea and land in constant pay; yet he was a considerable gainer, because there was then scarce any other to be had, and the price was 26 l. a ton: but now there are several other alum-works in this county, which have taken a great part of the trade from hence; so that the works here have for some years lain neglected.

GITTITH, a Hebrew word occurring frequently in the Psalms, and generally translated *wine presses*. The conjectures of interpreters are various concerning this word. Some think it signifies a sort of musical instrument; others, that the psalms with this title were sung after the vintage; lastly, others, that the hymns of this kind were invented in the city of Gath. Calmet is rather of opinion, that it was given to the class of young women or songstresses of Gath to be sung by them; Psal. viii. 1. lxxxi. 1. lxxxiv. 1. Dr Hammond thinks that the psalms with this title were all set to the same tune, and made on Goliath the Gittite.

GIULA, a strong town of Upper Hungary, on the frontiers of Transilvania. It was taken by the Turks in 1566, and retaken by the Imperialists in

1695. It is seated on the river Keresblan, in E. Long. ^{Glustandel} 21. 1. N. Lat. 46. 25. ^{Glaciers.}

GIUSTANDEL, a large and strong town of Turkey in Europe, and in Macedonia, with a Greek archbishop's see. It is seated near the lake Ochrida, in E. Long. 20. 50. N. Lat. 41. 10.

GLACIERS, a name given to some very extensive fields of ice among the ALPS.—Mr Coxe observes of these mountains in general, that they are composed of many parallel chains, the highest of which occupy the centre, and the others gradually diminish in proportion as we recede from thence. The central chain appears covered with pointed rocks; all parts of which, that are not absolutely perpendicular, lie hid under perpetual snow and ice even in summer. On each side of this ridge are fertile and cultivated valleys, interspersed with numerous villages, and watered by numerous streams. The elevated peaks of the central chain are covered with snow: but their declivities, excepting those that are extremely steep, have all a covering of ice as well as snow; the intermediate parts being filled with vast fields of ice, terminating in the cultivated valleys above mentioned. The same phenomena, though on a smaller scale, occur in those chains that are at a distance from the principal one: In those which are most remote, no ice, and scarcely any snow, is observed, unless upon some of the most elevated summits; and the mountains diminishing in height and ruggedness, appear covered with verdure, until at last they terminate in small hills and plains.

Thus the glaciers may be divided into two sorts; one occupying the deep valleys situated in the bosom of the Alps, and distinguished by the name of Ice-valleys; the others are those which clothe the declivities and sides of the mountains. These two kinds of glaciers are distinguished by Mr Coxe into the upper and lower glaciers.

The lower glaciers are by far the most considerable; some of them extending several leagues in length. They do not communicate with each other, as has been generally supposed, few of them being parallel to the central chain; but, stretching mostly in a transverse direction, are bordered at the higher extremity by inaccessible rocks, and at the lower extending into the cultivated valleys. The thickness of the ice varies in different parts. In the glacier des Bois, which extends more than 15 miles in length, and upwards of three in breadth, M. Saussure found it generally from 80 to 100 feet; but he was credibly informed that in some places it was not less than 600 feet, and even more. These vast masses of ice usually rest on an inclined plain; where, being pushed forward by their own weight, and but weakly supported by the rugged rocks beneath them, they are intersected by large crevices, and have an appearance of walls, pyramids, &c. according to the position of the eye in viewing them. In those parts, however, where they lie upon even ground, or such as has only a gentle inclination, the surface of the ice is nearly uniform, the crevices being few and narrow, and the glacier being crossed by travellers on foot without any difficulty. The surface of the ice is rough and granulated, so that people may walk upon it excepting such places as have a steep descent. It is opaque, full of small bubbles about the size of a pea, very porous, and greatly resembles a mixture of snow and water congealed.

Glaciers

ed. A vast quantity of stones and earth falls down from the mountains upon the glaciers, and are by them thrown off on each side according to the descent of the ice, as will be afterwards explained. The place on which these rest is more hard and elevated than the rest of the ice, and is very difficult to walk upon; the earth is likewise laid upon them in such regular heaps, that it appears to have been done by art. This collection of earth and stones is termed by the natives the *Moraine*.

Mr Coxe, who visited the glacier des Bois, informs us, that the appearance of it at a distance was so tremendous, that it seemed impracticable to cross it. Numerous and broad chasms intersected it in every direction; but entering upon it, the company found that courage and activity were only required to accomplish the task. They had large nails in their shoes and spiked sticks; which on this occasion were found to be particularly serviceable. Having passed the Moraine, and descended upon the glacier itself, they found the ice softened by a warm wind which rendered it less slippery than usual. Having walked across it for about a quarter of an hour, they came again to the Moraine, along which they continued their journey for half an hour, and then entered upon the great body of the glacier. "Here (says Mr Coxe) it was curious to observe the numerous little rills produced by the collection of drops occasioned by the thawing of the ice on the upper part of the glacier: these little rills hollow out small channels, and, torrent-like, precipitate themselves into the chasms with a violent noise, increasing the body of waters formed by the melting of the interior surface, and finding an outlet under the immense arch of ice in the valley of Chamouni, from which the Arveron rushes." As our traveller proceeded on his journey, he was surprised by the noise of a large fragment of rock which had detached itself from one of the highest needles, and bounded from one precipice to another with great rapidity; but before it reached the plain, it was almost reduced to dust. "Having proceeded about an hour (says he), we were astonished with a view more magnificent than imagination can conceive: hitherto the glaciers had scarcely answered my expectations, but now they far surpassed them. Nature had clad herself in all her terrors. Before us was a valley of ice 20 miles in extent, bounded by a circular glacier of pure unbroken snow, named Takul, which leads directly to the foot of Mont Blanc, and is surrounded by large conical rocks, terminating in sharp points like the towers of an ancient fortification; to the right rose a range of magnificent peaks, their intervals filled with glaciers; and far above the rest, the magnificent summit of Mont Blanc, his highest point obscured with clouds. He appeared of such immense magnitude, that, at his presence, the circumjacent mountains, however gigantic, seemed to shrink before him, and *hide their diminished heads*. In half an hour we arrived at the Moraine, which forms a boundary of the valley, crossed it, and proceeded upon a body of ice about three quarters of a mile broad. Here the ice was more even and free from chasms than in the great valley. We then passed a second moraine, and beyond that another mass of ice to a third moraine: descending from thence we came upon the last ridge of ice, broader considerably than the two former, and full of large chasms: it is separated from

the rock only by a very narrow moraine. These moraines contain great quantities of crystal."

Glaciers.

They continued to ascend the valley of ice, the scene constantly increasing in magnificence and horror; and having walked about five miles on the ice, they arrived at last at the foot of the eminence named *Couvercle*, where they were obliged to quit the ice. The doing this was extremely dangerous, and at one place very tremendous. It was a bulging smooth rock, with a precipice of considerable depth terminated by a vast crevice in the ice, which seemed to stop all further progress: a small hollow in the middle, however, afforded room for one foot; and having fixed this, they sprang over to the other side, being helped and directed by the guides who went over first. Having gained the top of the *Couvercle*, they had a view of three of the glaciers, viz. that of *Talefre* to the left, *l'Eclaut* in front, and *Takul* on the right; all uniting in that great one called the *Glacier de Bois*. The *Couvercle* itself is a most extraordinary rock, having the appearance of a large irregular building with many sides; the substance of which is granite. Having reached the top, they were surprised with a thunder-storm, from whence they took shelter under an impending rock. The view was exceedingly magnificent; the glaciers appearing like a rugged expanse of frozen sea bounded by gigantic rocks, and terminated by Mount Blanc. A single rock appeared of a triangular figure, covered with Alpine plants; and which, by reason of its contrast with the rugged and snowy mountains in the neighbourhood, has obtained the name of the *Garden*.—During this, as well as other excursions among the Alps, Mr Coxe had occasion to observe that the colour of the sky was of a much deeper blue than in the lower regions.

The upper glaciers may be subdivided into those which cover the summits, and those which extend along the sides of the Alps. Those on the very summit, however, though they have the appearance of ice, are not so in reality, but consist entirely of snow hardened by the extreme cold. M. Saussure found that which covered the top of Mount Blanc to be penetrable, though with difficulty, by a stick; but below this hard crust was a soft snow without coherence. The sides are covered with a mixture of ice and snow; by reason of the superior power of the summer sun to dissolve the snow, which afterwards congeals into hard ice.

Several conjectures have been made concerning the formation of these extraordinary bodies of ice. Mr Coxe agrees with M. Gruner in opinion, that they are produced by the continual dissolution of the snow in summer, and its congelation by the succeeding frosts. Hence, on the summits of the mountains where the sun has very little power, the glacier is soft, and contains no ice: as we descend the mountains the consistence becomes firmer, because there is a considerable mixture of snow-water, the congelation of which augments the hardness; and in the valleys, the glacier is hardest of all, because the portion of water is there much superior to that of the snow. Hence it seems plain that the glaciers derive their origin from the melting of the snow on the upper parts of the mountains, and the congelation of the water as it advances: and to this cause M. Saussure adds the quantity of snow which often rolls down into the valleys and congeals along with the water just mentioned.

Another.

Glaciers.

Another question concerning the glaciers naturally occurs, namely, Whether they are to be considered as in a state of increase or diminution? Mr Coxe is of opinion, that they occasionally increase and decrease; in proof of which he adduces the following observation. "The borders of the glacier of Montanvert are mostly skirted with trees: towards its base a vast arch of ice rises to near 100 feet in height; under which the river Arveron rushes with considerable force, and in a large body of water. As we approached the ice, we passed through a wood of firs: those trees which stand at a little distance from the arch are about 80 feet high, and are undoubtedly of a very great age. Between these and the glacier the trees are of a later growth; as is evident from their texture and inferior size. Others, still smaller, have been overturned and enveloped in the ice: there seems to be a kind of regular gradation in the age of these several trees, from the largest which are standing, to the smallest that lie prostrate."—Hence our author concludes, that the glacier once extended as far as the row of small firs; but that, upon its gradual dissolution, a number of trees shot up on the spot it had occupied; since which time the ice has again advanced, and overturned the last grown trees before they had attained to any considerable height.—This he thinks also confirmed by the following fact.—"Large stones of granite are usually found at a small distance from the extremities of the glacier. These stones have certainly fallen from the mountains upon the ice; have been carried on in its progress; and have tumbled into the plain upon the dissolution or sinking of the ice which supported them. These stones, which the natives call *Moraine*, form a kind of border towards the foot of the valley of ice, and have been pushed forward by the glacier in its advances: they extend even to the place occupied by the larger pines."

In opposition to those who maintain that there is a constant accumulation of ice and snow in the Alpine regions, our author makes the following remarks. 1. Between the years 1776 and 1785 the glacier of Grindelvald had diminished to such a degree, that the spot which its extremity occupied in the former year, was at least 400 paces from that occupied by it in the latter. 2. In the year 1785 the *Murailles de Glace*, which in 1776 he had described as forming the border of the glacier of Boffon, no longer existed; and young trees had shot up in the parts which were then covered by the glacier of Montanvert. Still, however, it may be urged, that these changes only take place in the valleys where the power of the sun is considerable; and that from thence we cannot form any adequate idea of what passes in the more elevated regions, where in all probability more snow falls than can be dissolved. In support of this opinion, it is alleged, that the cold produced by the mass of ice already formed ought to augment it still more; and that, within the memory of the present generation, many places have been covered with ice which were not so before. To these arguments, however, Mr Coxe replies, that the causes, which diminish the ice in the upper regions, are no less powerful than the cold which tends to augment it. These are, 1. Rain or sleet; which falling upon the lower glaciers, thaw the ice, increase the rills on its surface, excavate channels, and in many ways tend to diminish its quantity. 2. Evaporation, which takes

place even from the surface of the ice itself, acts still more powerfully; and its action is not confined to any particular season. 3. The falling of the snow and ice; both that which comes gradually from the clouds, and which descends from the mountains in great masses, called by the natives *avalanches*. When these last fall down into milder regions, though sometimes they may resist the influence of the sun and form ice-valleys, yet they generally dissolve. They are most common in the upper glaciers, though sometimes they descend upon the lower, while the gradual descent of snow from the clouds, which chiefly takes place in the lower, contributes very much to lessen the mass. 4. All the lower glaciers or valleys of ice rest on an inclined plane, are hollow, and undermined by torrents which are constantly flowing from the upper glaciers, as well as from their own lowermost surface. Their foundation being thus constantly diminishing, the lower glaciers are carried imperceptibly forward into the cultivated fields, where an end is necessarily put to their progress by the heat of the sun. Hence we may see the reason of that strange phenomenon taken notice of by Mr Coxe, that with one hand he could touch ripe corn, and with the other solid ice. This descent of the glacier is demonstrable from the trees overturned by it, and the morain always observed at the bottom of the lower glaciers. 5. The heat of the sun is an evident cause of the diminution of the glaciers. To this Mr Coxe adds another cause less generally known, viz. the warm winds which blow by night as well as by day both in the upper and lower glaciers. "These warm winds (says he) are during summer so common in those parts, that I never crossed a glacier without feeling in some particular positions a warmth similar to the air of a hot-bath." 6. Another cause is the mean temperature of the earth itself; which, where it is not exposed to the piercing cold of the atmosphere, is found to have a temperature always above the freezing point. As the vast thickness of the superincumbent ice, therefore, is in the present case abundantly sufficient to prevent the access of the atmosphere, it is plain that the lower surface of it must, by being in contact with the earth, continually decay. With regard to the other argument drawn from the known increase of the ice in some places, Mr Coxe does not deny it; but insists, that there is no continual increase of the whole, but that if it increases in some places, it diminishes in others; and his opinion in this respect was confirmed by those who frequent the mountains.

GLACIS, in building, an easy insensible slope or declivity.

The descent of the glacis is less steep than that of the talus. In gardening, a descent sometimes begins in talus, and ends in glacis.

The glacis of the corniche, is an easy imperceptible slope in the cymatium, to promote the descent and draining off the rain-water.

GLACIS, in fortification, that mass of earth which serves as a parapet to the covered way, sloping easily towards the champaign or field.

GLADE, in gardening and agriculture, an opening and light passage made through a wood, by lopping off the branches of trees along that way.

GLADIATORS, in antiquity, persons who fought, generally.

Glaciers
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Gladiators.

Gladiators. generally in the arena at Rome, for the entertainment of the people.

The gladiators were usually slaves, and fought out of necessity; though sometimes freemen made profession thereof, like our prize-fighters, for a livelihood.

The Romans borrowed this cruel diversion from the Asiatics: some suppose that there was policy in the practice, the frequent combats of gladiators tending to accustom the people to despise dangers and death.

The origin of such combats seems to be as follows. From the earliest times with which we have any acquaintance in profane history, it had been the custom to sacrifice captives, or prisoners of war, to the manes of the great men who had died in the engagement: thus Achilles, in the Iliad, lib. xxiii. sacrifices twelve young Trojans to the manes of Patroclus; and in Virgil, lib. xi. ver. 81. Æneas sends captives to Evander, to be sacrificed at the funeral of his son Pallas.

In course of time they came also to sacrifice slaves at the funerals of all persons of condition: this was even esteemed a necessary part of the ceremony; but as it would have appeared barbarous to have massacred them like beasts, they were appointed to fight with each other, and endeavour to save their own lives by killing their adversary. This seemed somewhat less inhuman, because there was a possibility of avoiding death, by an exertion of skill and courage.

This occasioned the profession of gladiator to become an art: hence arose masters of the art, and men learned to fight and exercise it. These masters, whom the Latins called *lanistæ*, bought them slaves to be trained up to this cruel trade, whom they afterwards sold to such as had occasion to present the people with so horrible a show.

These exhibitions were at first performed near the sepulchre of the deceased, or about the funeral pile; but were afterwards removed to the circus and amphitheatres, and became ordinary amusements.

The first show of gladiators, called *munus gladiatorum*, was exhibited at Rome, according to Valerius Maximus, by M. and D. Brutus, upon the death of their father, in the year of the city 490. On this occasion there were probably only three pair of gladiators. In 537, the three sons of M. Æmilius Lepidus the augur, who had been three times consul, entertained the people with the cruel pleasure of seeing 22 gladiators fight in the forum. In 547, the first Africanus diverted his army at New Carthage with a show of gladiators, which he exhibited in honour of his father and uncle, who had begun the reduction of Spain. In process of time, the Romans became so fond of these bloody entertainments, that not only the heir of any great and rich citizen lately deceased, but all the principal magistrates, presented the people with shows of this nature, to procure their affection. The ædiles, pretors, consuls, and, above all, the candidates for offices, made their court to the people, by entertaining them frequently with these fights: and the priests were sometimes the exhibitors of the barbarous shows; for we meet with the *ludi pontificales* in Suetonius, August. cap. 44. and with the *ludi sacerdotales*, in Pliny, Epist. lib. vii. As for the emperors, it was so much their interest to ingratiate themselves with the populace, that they obliged them with combats of gladiators almost upon all occasions; and as these increased, the number of combatants in-

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creased likewise. Accordingly, Julius Cæsar, in his Gladiators. ædileship, diverted the people with 320 couple. Titus exhibited a show of gladiators, wild beasts, and representations of sea-fights, which lasted 100 days; and Trajan continued a solemnity of this nature for 123 days; during which time he brought out 1000 pair of gladiators. Before this time, under the republic, the number of gladiators was so great, that when the conspiracy of Catiline broke out, the senate ordered them to be dispersed into the garrison and secured, lest they should have joined the disaffected party. See *GLADIATOR'S War*.

These sports were become so common, and their consequences in a variety of respects so dangerous, that Cicero preferred a law that no person should exhibit a show of gladiators within two years before he appeared candidate for any office. Julius Cæsar ordered, that only a certain number of men of this profession should be in Rome at a time; Augustus decreed, that only two shows of gladiators should be presented in a year, and never above sixty couple of combatants in a show; and Tiberius provided by an order of senate, that no person should have the privilege of gratifying the people with such a solemnity unless he was worth 400,000 sesterces. They were also considerably regulated by Nerva.

The emperor Claudius restrained them to certain occasions: but he soon afterwards annulled what he decreed, and private persons began to exhibit them at pleasure as usual; and some carried the brutal satisfaction so far as to have them at their ordinary feasts. And not slaves only, but other persons, would hire themselves to this infamous office.

The master of the gladiators made them all first swear that they would fight to death; and if they failed, they were put to death either by fire or swords, clubs, whips, or the like.

It was a crime for the wretches to complain when they were wounded, or to ask for death or seek to avoid it when overcome; but it was usual for the emperor or the people to grant them life when they gave no signs of fear, but waited the fatal stroke with courage and intrepidity: Augustus even decreed that it should always be granted them.

From slaves and freedmen the inhuman sport at length spread to people of rank and condition; so that Augustus was obliged to issue a public edict that none of the senatorian order should become gladiators; and soon after he laid the same restraint on the knights: nevertheless Nero is related to have brought upwards of 400 hundred senators and 600 Roman knights upon the arena; though Lipsius takes both these numbers to be falsified, and not without reason reduces them to 40 senators and 60 knights: yet Domitian, that other monster of cruelty, refined upon Nero, exhibiting combats of women in the night-time.

Constantine the Great is said to have first prohibited the combats of gladiators in the East. At least he forbade those who were condemned to death for their crimes to be employed; there being an order still extant to the *præfatus prætorii* rather to send them to work in the mines in lieu thereof: it is dated at Berytus in Phenicia the 1st of October 325.

The emperor Honorius forbade them at Rome on occasion of the death of Telemachus, who coming out of

of the East into Rome at the time of one of these spectacles, went down into the arena, and used all his endeavours to prevent the gladiators from continuing the sport; upon which the spectators of that carnage, fired with anger, stoned him to death. It must be observed, however, that the practice was not entirely abolished in the West before Theodoric king of the Ostrogoths. Honorius, on the occasion first mentioned, had prohibited them; but the prohibition does not seem to have been executed. Theodoric, in the year 500, abolished them finally.

Some time before the day of combat, the person who presented the people with the shows gave them notice thereof by programmas or bills, containing the names of the gladiators, and the marks whereby they were to be distinguished: for each had his several badge; which was most commonly a peacock's feather, as appears from the scholiast of Juvenal on the 158th verse of the third satire, and Turnebus Advers. lib. ii. cap. 8. They also gave notice how long the shows would last, and how many couples of gladiators there were; and it even appears, from the 52d verse of the seventh satire of the second book of Horace, that they sometimes made representations of these things in painting, as is practised among us by those who have any thing to show at fairs.

The day being come, they began the entertainment by bringing two kinds of weapons; the first were staves or wooden files, called *rudes*; and the second were effective weapons, as swords, poniards, &c. The first were called *arma lusoria*, or *exertitoria*; the second *decretoria*, as being given by decree or sentence of the prætor, or of him at whose expence the spectacle was exhibited. They began to fence or skirmish with the first, which was to be the prelude to the battle; and from these, when well warmed, they advanced to the second at the sound of the trumpets, with which they fought naked. Then they were said *vertere arma*. The terms of striking were *petere* & *repetere*; of avoiding a blow, *exire*; and when one of the combatants received a remarkable wound, his adversary or the people cried out, *Habet*, or *Hoc habet*. The first part of the engagement was called *ventilare*, *præludere*; and the second, *dimicare ad certum*, or *versis armis pugnare*: and some authors think, with much probability, that it is to these two kinds of combat that St Paul alludes in the passage 1 Cor. ix. 26, 27. "I fight, not as one that beateth the air; but I keep my body, and bring it into subjection."

If the vanquished surrendered his arms, it was not in the victor's power to grant him life: it was the people during the time of the republic, and the prince or people during the time of the empire, that were alone empowered to grant the boon. The reward of the conqueror was a branch of palm-tree, and a sum of money, probably collected among the spectators: sometimes they gave him his congé, or dismissed him by putting one of the wooden files or *rudis* in his hand; and sometimes they even gave him his freedom, putting the pileus on his head. The sign or indication, whereby the spectators showed that they granted the favour, was *premere pollicem*, which M. Dacier takes to be a clenching of the fingers

of both hands between one another, and so holding the two thumbs upright close together; and, when they would have the combat finished and the vanquished slain, *verterunt pollicem*, they bent back the thumb; which we learn from Juvenal, Sat. iii. ver. 36. The gladiators challenged or defied each other, by showing the little finger; and, by extending this, or some other, during the combat, they owned themselves vanquished, and begged mercy from the people: *Viti ostensum digiti veniam a populo postulabant*, says the old scholiast on Persius.

There were various kinds of gladiators, distinguished by their weapons, manner, and time of fighting, &c. as, The *andabata*, mentioned under *ΑΝΔΑΒΑΤÆ*. The *caterarii*, who always fought in troops or companies, number against number; or, according to others, who fought promiscuously, without any certain order. The *dimache*, who fought armed with two poniards or swords, or with sword and dagger. The *essedarii*, who fought in cars. The *fiscales*, or *Cæsariani*, who belonged to the emperor's company; and who, being more robust and dexterous than the rest, were frequently called for; and therefore named also *postulatii*. Several other kinds are mentioned in the ancient authors.

GLADIATORS War (*bellum Gladiatorium* or *Spartacum*), called also the *servile war*, was a war which the Romans sustained about the year of their city 680. Spartacus, Crinus, and Oenomaus, having escaped, with other gladiators to the number of seventy-four, out of the place where they had been kept at Capua, gathered together a body of slaves, put themselves at their head, rendered themselves masters of all Campania, and gained several victories over the Roman prætors. At length they were defeated in the year 682, at the extremity of Italy; having, in vain, attempted to pass over into Sicily.

This war proved very formidable to the Romans. Crassus was not able to finish it: the great Pompey was forced to be sent as general.

The *Dying GLADIATOR*, a most valuable monument of ancient sculpture, which is now preserved in the palace of Chigi. This man, when he had received the mortal stroke, is particularly careful *ut procumbat honeste*, that he might fall honourably. He is seated in a reclining posture on the ground, and has just strength sufficient to support himself on his right arm: and in his expiring moments it is plainly seen, that he does not abandon himself to grief and dejection; but is solicitous to maintain that firmness of aspect which the gladiators valued themselves on preserving in this season of distress, and that attitude which they had learnt of the masters of defence. He fears not death, nor seems to betray any tokens of fear by his countenance, nor to shed one tear: *quis mediocris gladiator ingemuit, quis vultum mutavit unquam, quis non modo stetit, verum etiam decubuit turpiter*, says Cicero, in that part of his Tusculan where he is describing the astonishing firmness of those persons. We see, in this instance, notwithstanding his remaining strength, that he has but a moment to live; and we view him with attention, that we may see him expire and fall: thus the ancients knew how to animate marble, and to give it almost every expression of life.

GLADIOLUS, CORN-FLAG: A genus of the
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Gladiator.
Gladiolus.

Glair,
Glamor-
ganshire.

monogynia order, belonging to the triandria class of plants; and in the natural method ranking under the sixth order, *Enfate*. The corolla is sexpartite, and ringent; the stamina ascending and bending upwards. There are 10 species, of which the most remarkable is the communis, or common gladiolus. This hath a round, compressed, tuberous root; long sword-shaped leaves; an erect flower-stalk, two or three feet high; the top garnished with several pretty large flowers of a red or white colour, having each six petals. They appear in May and June, and are succeeded by plenty of seed in August. The plants are very hardy, and will thrive in any soil or situation. They are propagated by offsets from the roots.

GLAIR of eggs, is the same as the white of eggs, and is used as a varnish for preserving paintings. For this purpose it is beat to an unctuous consistence, and commonly mixed with a little brandy or spirit of wine, to make it work more freely, and with a lump of sugar to give it body and prevent its cracking: and then spread over the picture or painting with a brush.

GLAMORGANSHIRE, a county of South Wales, said to have derived its name from a contraction of the Welsh words *Gwald Morgan*, or "the county of Morgan," and supposed to have been thus called from a prince of this part of the country, said to have been killed 800 years before the birth of our Saviour: but some other writers derive the name from the word *Mor*, which in the British tongue signifies the *sea*; this being a maritime county. It is bounded on the south, and part of the west, by Bristol channel; on the north-west, by Caermarthenshire; on the north, by Brecknockshire; and on the east, by Monmouthshire. It extends 48 miles in length from east to west, 27 in breadth from north to south, and is 116 in circumference. It is divided into 10 hundreds, in which are one city, 7 market-towns, 118 parishes, about 10,000 houses, and 58,000 inhabitants. It is in the diocese of Llandaff. This county, in the time of the Romans, was part of the district inhabited by the Silures, and had several Roman stations. Thus Boverton, a few miles to the south of Cowbridge, is supposed to be the Bovium of Antoninus; Neath to be his Nidum; and Loghor, to the west of Swansea, to be his Leucarum. The principal rivers of this county are the Rhymny, the Taff, the Ogmere, the Avon, the Cledaugh, and the Tawe. The air, in the south part, towards the sea, is temperate and healthful; but the northern part, which is mountainous, is cold and piercing, full of thick woods, extremely barren, and thin of inhabitants. The mountains, however, serve to feed herds of cattle, and send forth streams which add greatly to the fertility of the other parts of the county: they have likewise coal and lead-ore. The south part is so remarkably fertile, pleasant, and populous, that it is generally styled the garden of Wales; but it has no manufacture. This county was formerly full of castles, most of which are now fallen to decay. It has many small harbours on the coast for exporting coals and provisions. Of the former it sends large quantities both to England and Ireland; but of the latter, to England almost solely, especially butter. It sends two members to parliament, one for the shire, and one for the borough of Cardiff the capital.

GLAMOUR, or GLAMER, an old term of popular superstition in Scotland, denoting a kind of magical mist believed to be raised by forcerers, and which deluded their spectators with visions of things which had no real existence, altered the appearance of those which really did exist, &c.—The eastern nations have a similar superstition, as we may learn from the Arabian Nights Entertainments and other works of Oriental fiction.

GLAND, in anatomy. See ANATOMY, n° 128.

GLANDERS. See FARRIERY, § xvi.

GLANDORE, a town of Ireland, situated in the county of Cork and province of Munster, near the harbour of that name.

GLANDORE-Harbour, situated two leagues west of the Galley-head in the county of Cork, province of Munster, N. Lat. 51. 22. W. Lon. 8. 56. Between this harbour and Ross the coast continues high and bold, with only two small coves; that to the east called *Millicove*, and that to the west *Cowcove*. This harbour lies three miles west of Ross; and though small, is an exceeding good one; near it is a castle of the same name, and on the upper-end is a deep and dangerous glyn, called the *Leap*. Glandore gives title of earl to the family of Crosbie.

GLANDORP (Matthias), a learned physician, born in 1595, at Cologne, in which town his father was a surgeon. After receiving a doctor's degree at Padua, and visiting the principal towns of Italy, he settled at Bremen in 1618, where he practised physic and surgery with so much success, that he was made physician to the republic and to the archbishop. He published at Bremen, *Speculum chirurgorum, Methodus medendæ paronychiæ, Tractatus de polypo narium affectu gravissimo*, and *Gazophylacium polypusum fontivissimo*; which four pieces were collected and published, with his life prefixed, at London, in 4to, 1729. Glandorp died young; and it must suggest a high opinion of his abilities, that, notwithstanding the great improvements in all branches of science, his works should be deemed worthy a republication 100 years after his death.

GLANDULÆ Renales. See ANATOMY, n° 100.

GLANS, in anatomy, the tip or button of the penis, or that part covered with the prepuce, called also *balanus*. See ANATOMY, p. 739, col. 1.

GLANS is also used to denote the tip or extremity of the clitoris, from its resemblance, both in form and use, to that of the penis. See ANATOMY, p. 739, col. 2.

GLANVIL (Joseph), a learned and ingenious, but fanciful and credulous writer in the 17th century, was born at Plymouth in 1636, and bred at Oxford. He became a great admirer of Mr Baxter, and a zealous person for a commonwealth. After the restoration, he published *The vanity of dogmatizing*; was chosen a fellow of the Royal Society; and, taking orders in 1662, was presented to the vicarage of Frome-Selwood in Somersetshire. This same year he published his *Lux Orientalis*; in 1665, his *Scep sis Scientifica*; and in the year following, *Some philosophical considerations touching the being of witches and witchcraft*, and other pieces on the same subject. In 1660, he published *Plus ultra*; or, *The progress and advancement of knowledge since the days of Aristotle*. He likewise published

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A seasonable recommendation and defence of reason; and Philosophia Pia, or A discourse of the religious temper and tendencies of the experimental philosophy. In 1678 he was made a prebendary of Worcester, and died in 1680.

GLARIS, one of the cantons of Swisserland, is bounded on the east, partly by the Grisons, and partly by the territory of Sargans; on the north, by the bailiwick of Gaster, and by the lake Wahlestatt; on the east, by the canton of Schwits; and on the south, by part of the canton of Uri, and part of the league of the Grisons. It is a mountainous country, being entirely within the Alps.

GLARIS, a town of Swisserland, capital of the canton of the same name, is seated in a plain, at the foot of high craggy mountains. The streets are large, and the houses kept in good repair. It has some public buildings; among which are two churches, one in the middle of the town, and the other without upon an eminence. On this eminence there is a cavern, with grotesque figures formed by the water that drops therein. The general assemblies of the country are held here on the first Sundays in May, where all the males above the age of sixteen are obliged to appear. Both the Calvinists and the Roman Catholics are tolerated in this town, and they have divine service by turns in the same church. It is seated on the river Lint, E. Long. 9. 13. N. Lat. 47. 6.

GLASGOW, a large city of Lanerkshire or Clydesdale in Scotland, situated in W. Long. 4. 30. N. Lat. 55. 50.

Concerning the foundation of this city we have no authentic records. The word in the Gaelic language signifies a *gray smith*; from whence it has been inferred, that some spot in the most ancient part of the city was originally the residence of some blacksmith who had become eminent in his profession, so that the place went by his name.

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Glasgow,
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nded.

In the year 560, a bishopric is said to have been founded here by Saint Mungo, or Kentigern, supposed to be the son of Thamates, daughter of Loth king of the Picts; but in what state the town at that time was, is altogether uncertain. Most probably the priests and disciples who attended St Kentigern would contribute considerably towards its advancement: the aged and infirm, who were unfit for the purposes of war, or such as were religiously inclined, would come and settle round the habitation of the holy man, in order to have the benefit of his prayers; and as a number of miracles were said to have been wrought at his tomb, the same causes would still contribute to the increase of the town.

History has not informed us of the name of the prince who founded and endowed the bishopric of Glasgow in favour of St Kentigern. But from an abstract of the life of Kentigern (contained in Mr Innes's Critical Essay on the Ancient Inhabitants of Scotland), which was written in the 12th century, we learn, that the saint being ill used by Marken or Marcus, one of the kings of the Britons, retired into Wales. On the invitation of Roderic, however, one of Marken's successors, he returned to Glasgow, and enjoyed the see till 601, when he died. He was buried in the church of Glasgow, where his monument is still to be seen;

and we find him marked among the saints in the Roman calendar, January 13. 578.

The immediate successors of Kentigern were Baldrede and Conwal. The first established a religious house at Inchinnan; the second went into Lothian to preach to the Saxons; and both of them are ranked as saints in the Roman calendar, Baldrede on the 6th of March 608, and Conwal on the 18th of May 612. From this time, however, till the 1115, we have no distinct accounts concerning the city or bishopric of Glasgow. We find then, that David I. king of Scotland made an attempt to retrieve the people from a state of gross barbarity into which they were fallen, and restored to the church those lands of which she had been robbed. The only account we have of the transactions with regard to Glasgow, during that period, is in the inquisition made by David concerning the church-lands of Glasgow, and is as follows.—“This church, by the divine appointment, admitted St Kentigern into the bishopric, who furnished large draughts of knowledge to those thirsting after heavenly things, &c. But a fraudulent destroyer, employing his common wiles, brought in, after a long series of time, unaccountable scandals into the Cumbrian church. For after St Kentigern and many of his successors were removed to heaven, various disturbances every where arising, not only destroyed the church and her possessions, but, wasting the whole country, drove the inhabitants into exile. These good men being destroyed, various tribes of different nations flocking in from several quarters, possessed the foresaid deserted country; but being of different origins, and varying from each other in their language and customs, and not easily agreeing among themselves, they followed the manners of the Gentiles, rather than those of the true faith. The inhabitants of which unhappy and abandoned country, though living like brutes, the Lord, who chooseth that none should perish, vouchsafed to visit in mercy,” &c.

2
Barbarity of
the people
in the time
of David I.

From the year 1116 to the reformation, the records of the bishopric are tolerably complete. The most remarkable particulars furnished by them are the following.

In 1136, John Achaius, chosen bishop of Glasgow by David I. built and adorned a part of the cathedral, which he solemnly consecrated on the 9th of July. The king was present at the ceremony; and bestowed on the church the lands of Perdeyk, now Patrick. This prelate also divided the diocese into the two archdeanries of Glasgow and Teviotdale; and established the offices of dean, subdean, chancellor, treasurer, sacrist, chanter, and successor; and settled a prebendary upon each of them, out of the donatives he received from the king.

In 1174, Joceline, abbot of Melrose, was elected bishop, and consecrated by Eskilus, bishop of Lunden in Denmark, the Pope's legate for that kingdom, on the 1st of June 1175. He rebuilt the cathedral, or rather made an addition to the church already built by John Achaius. He also procured a charter from William king of Scotland, erecting Glasgow into a royal borough, and likewise a charter for a fair to be held there annually for eight days.

3
Glasgow
erected into
a royal
borough.

In 1335, John Lindsay, bishop of Glasgow, was
5 C 2 killed

Glasgow. killed in an engagement at sea with the English, as he was returning home from Flanders. His successor, William Rae, built the stone bridge over the Clyde. In the time of Matthew Glendonig, who was elected bishop in 1387, the great spire of the church, which had been built only of wood, was consumed by lightning. The bishop intended to have built another of stone; but was prevented by death, in 1408, from accomplishing his purpose. His successor, William Lauder, laid the foundation of the vestry of the cathedral, and built the great tower of stone as far as the first battlement. The great tower of the episcopal palace was founded about the year 1437, on which bishop Cameron expended a great deal of money.

⁴ In 1447, William Turnbull, a son of the family of Bedrule in Roxburgh shire, was chosen bishop. He obtained from king James II. in 1450, a charter erecting the town and the patrimony of the bishops into a regality. He also procured a bull from pope Nicholas V. for erecting an university within the city, which he endowed, and on which he also bestowed many privileges. He died in 1454, leaving behind him a most excellent character. The establishment of the college contributed more than any thing that had been formerly done towards the enlargement of the town. Before this time the town seems to have been inconsiderable. Mr Gibson * is of opinion, that the number of its inhabitants did not exceed 1500.

• *Hist. of Glasgow,*
P. 74.

⁵ Which destroys the freedom of the city.

⁶ Population of Glasgow increased by the university.

But though the establishment of the university greatly increased the number of inhabitants, it in fact destroyed the freedom of the town. Bishop Turnbull seems to have made a point of it with king James II. that the city of Glasgow, with the bishops' forest, should be erected into a regality in his favour; which was accordingly done at the time above-mentioned; and this at once took away all power from the citizens, and transferred it to the bishop. As the powers of the bishop, however, were reckoned by Turnbull insufficient to convey to the members of the university all that freedom which he wished to bestow upon them, he therefore obtained from the king a great many privileges for them; and afterwards he himself, with the consent of his chapter, granted them many more.

The good effects of the establishment of the college were very soon obvious in Glasgow. The number of inhabitants increased exceedingly; the high street, from the convent of the Black friars, to where the cross is now placed, was very soon filled up; the ancient road which led to the common being too far distant for the convenience of the new inhabitants, the Gallows-gate began to be built. Soon after, the collegiate church of the blessed Mary (now the Tron-church) being founded by the citizens, occasioned the Trongate street to be carried to the westward as far as the church. The rest of the city increased gradually towards the bridge, by the building of the Salt-market street. The borough-roads, and the cattle that grazed on the commons, were now found insufficient to maintain the increased number of inhabitants; for which reason a greater degree of attention than formerly was paid to the fishing in the river. Many poor people subsisted themselves by this occupation; they were incorporated into a society; and in order that they might be at hand to prosecute their business, they built a considerable

part of the street now called the *Bridge-gate*, but at that time *Fishers gate*.

Notwithstanding all this, however, the city of Glasgow did not for a long time attain the rank among the other towns of Scotland which it holds at present. In 1556, it held only the 11th place among them, as appears by queen Mary's taxation. The introduction of the reformed religion proved for some time prejudicial to the opulence of the city. The money which had formerly been expended among the citizens by the bishop and his clergy, was now diverted into other channels: the advantages resulting from the university were also for a time lost; for as the reformers generally despised human learning, the college was in a manner deserted.

In the time of the civil wars, Glasgow suffered severely. To the mischiefs attending intestine discord, were added a pestilence and famine; and to complete their misfortunes, a violent fire broke out in June 1652, which destroyed the greatest part of the Saltmarket, Trongate, and High-street. The fronts of the houses at that time were mostly of wood, so that they became an easy prey to the flames. The fire continued with great violence for the space of 18 hours; by which a great many of the inhabitants were ruined, the habitations of almost 1000 families being totally destroyed. On this account collections were made thro' different parts of the country; and to prevent such accidents for the future, the fronts were built with free stone, which abounds in the neighbourhood.

By the charter given to bishop Turnbull in 1450, the citizens had been deprived of the power of electing their own magistrates, which was thenceforth exercised by the bishop; which, however, was not done without some resistance on the part of the inhabitants. After the reformation was introduced into Scotland, we find this power exercised by the citizens, the bishop, the earl of Lenox, and others. The idea that the town was a bishop's borough, and not a royal free borough, gave occasion to this unsettled manner of appointing the magistracy; and though, in 1633, they were declared to be a royal free borough by the parliament, yet their freedom of election was afterwards disturbed by the privy-council, by Cromwell, and the duke of York. But on the 4th of June 1690, the town was declared free by a charter of William and Mary; and in confirmation of this charter it was inserted in the act of parliament, dated June 14th the same year, that they should have power to elect their own magistrates as fully and freely, in all respects, as the city of Edinburgh or any other royal borough within the kingdom; which freedom of election still continues.

By the assessment of the boroughs in 1695, we find the city of Glasgow reckoned the second in Scotland in point of wealth, which place it still continues to hold. To account for this great increase of wealth, we must observe, that for a long time, even before the restoration of Charles II. the inhabitants of Glasgow had been in possession of the sale both of raw and refined sugars for the greatest part of Scotland; they had a privilege of distilling spirits from their molasses, free of all duty and excise; the herring-fishery was also carried on to what was at that time thought a very considerable extent; they were the only people in Scotland who made

soap;

Glasgow. soap; and they sent annually some hides, linen, &c. to Bristol, from whence they brought back in exchange, a little tobacco, sugar, and goods of the manufacture of England, with which they supplied a considerable part of the kingdom. From the year 1707, however, in which the union between Scotland and England took place, we may date the prosperity of Glasgow. By the union, the American trade was laid open to the inhabitants: and so sensible were they of their advantageous situation, that they began almost instantly to prosecute that commerce; an assiduous application to which, ever since, hath greatly contributed to raise the city to the pitch of affluence and splendor which it at present enjoys. The city was now greatly enlarged; and as the community were sensible of the inconvenience that attended the want of a sufficiency of water in the river for carrying on their commerce, they resolved to have a port of their own nigher the mouth of the river. At first, they thought of making their harbour at Dumbarton: but as this is a royal borough, the magistrates opposed it; because they thought that the influx of sailors and others, occasioned by the harbour, would be so great, that a scarcity of provisions would be occasioned. The magistrates and town-council of Glasgow, therefore, purchased some lands on the south side of the river Clyde for this purpose; and so expeditious were they in making their harbour, and rearing their town, that in 1710 a bailie was appointed for the government of Port-Glasgow. It is now a very considerable parish, and lies 21 miles nigher the mouth of Clyde than Glasgow.

10.
Erection of
Port-Glas-
gow.

11.
Disturbance
about the
excise-bill.

In 1725, Mr Campbell, the member of parliament for Glasgow, having given his vote for having the malt-tax extended over Scotland, a riot ensued among the lower class of people. In this disturbance, Mr Campbell's furniture was destroyed, and some excisemen were maltreated for attempting to take an account of the malt. General Wade, who commanded the forces in Scotland, had sent two companies of soldiers, under the command of captain Bushe, to prevent any disturbance of this kind. Captain Bushe drew up his men in the street, where the multitude pelted them with stones. He first endeavoured to disperse the mob by firing with powder only: but this expedient failing, he ordered his men to load their pieces with ball; and, without the sanction of the civil authority, commanded them to fire four different ways at once. By this discharge about 20 persons were killed and wounded; which enraged the multitude to such a degree, that having procured some arms, they pursued Bushe and his men to the castle of Dumbarton, about 14 miles distant. General Wade being informed of this transaction, assembled a body of forces, and being accompanied by Duncan Forbes, lord advocate, took possession of the town: the magistrates were apprehended and carried prisoners to Edinburgh; but on an examination before the lords, their innocence clearly appeared, upon which they were immediately dismissed. Bushe was tried for murder, convicted, and condemned; but, instead of suffering the penalties of law, he was indulged with a pardon, and promoted in the service. Mr Campbell petitioned the House of Commons for an indemnification of his losses: a bill was passed in his favour; and this, together with some other expences

incurrd in the affair, cost the town 9000 l. Sterling.

Glasgow.

During the time of the rebellion in 1745, the citizens of Glasgow gave proof of their attachment to revolution principles, by raising two battalions, of 600 men each, for the service of government. This piece of loyalty, however, had like to have cost them dear. The rebels, in their journey south, took a resolution to plunder and burn the city: which would probably have been done, had not Mr Cameron of Lochiel threatened, in that case, to withdraw his clan. A heavy contribution, however, was laid on. The city was compelled to pay 5000 l. in money, and 500 l. in goods; and on the return of the rebels from England, they were obliged to furnish them with 12,000 linen shirts, 6000 cloth coats, 6000 pairs of shoes, 6000 pairs of hose, and 6000 bonnets. These goods, with the money formerly paid them, the expence of raising and subsisting the two city-battalions, and the charge of maintaining the rebel army in free quarters for ten days, cost the community about 14,000 l. sterling; 10,000 l. of which they recovered in 1749, by an application to parliament.

About the year 1750, a very considerable change took place in the manner of living among the inhabitants of Glasgow. Till this time, an attentive industry, and a frugality bordering upon parsimony, had been their general characteristic; the severity of the ancient manners prevailed in its full vigour: But now, when an extensive commerce and increased manufactures had produced wealth, the ideas of the people were enlarged, and schemes of trade and improvement were adopted which people would formerly have been denominated madmen if they had undertaken; a new style was introduced in living, dress, building, and furniture; wheel-carriages were set up, public places of entertainment were frequented, and an assembly-room, ball-room, and playhouse, were built by subscription; and from this time we may date all the improvements that have taken place, not only in Glasgow, but all over the west of Scotland. The best method, however, of estimating the growing improvement of any town, is by the frequency of their applications for assistance to parliament; we shall therefore enumerate the acts of parliament which have been passed in favour of the city of Glasgow since the year 1750. In 1753, an act passed for repairing several roads leading into the city of Glasgow.—In 1756, an act for erecting and supporting a lighthouse in the island of Little Cumray, at the mouth of the Clyde, and for rendering the navigation of the frith and river more safe and commodious.—In 1759, an act for improving the navigation of the river Clyde to the city of Glasgow, and for building a new bridge across the river.—In 1767, the people of Glasgow having proposed to make a small cut or canal from the frith of Forth to that of Clyde, for the convenience of their trade to the eastern side of the island, several gentlemen at Edinburgh, and throughout different parts of the kingdom, proposed that this canal should be executed upon a much larger scale than what had been originally projected. An act was accordingly obtained, and the canal executed in the manner described under the

12
Change of
manners
and method
of living.

13
Acts of
Parliament
in favour of
the city.

Glasgow. the article CANAL.—In 1770, another act was obtained for improving the navigation of the river, building the bridge, &c. being an amendment of the former act for these purposes.—In 1771, an act for making and widening a passage from the Salt-market to St Andrew's church; for enlarging and completing the church-yard of that church, and likewise for building a convenient exchange or square in the city; also for amending and explaining the former act relative to the navigation of the Clyde.—An act for making and maintaining a navigable canal and waggon-way from the collieries in the parishes of Old and New Monkland, to the city of Glasgow. This last canal, which was undertaken with a view to reduce the price of coals, has not been attended with the desired effect; but the other improvements have been productive of very great advantages.

14
Description
of the city.

The most ancient part of the city stands on a rising ground. The foundation of the cathedral is 104 feet higher than the bed of the river; and the descent from the high ground reaches to about 100 yards below the college. The rest of the city is built chiefly upon a plain, bounded southward by the Clyde, and northward by a gentle ridge of hills lying in a parallel direction with that river. These grounds till lately consisted of gardens and fields; but are now covering with buildings, in consequence of the increasing wealth and population of the city. The streets are all clean and well paved; and several of them intersecting one another at right angles, produce a very agreeable effect. The four principal streets, crossing one another in that manner, divide the city nearly into four equal parts; and the different views of them from the cross, or centre of intersection, have an air of great magnificence. The houses, consisting of four or five floors in height, are built of hewn stone, generally in an exceeding good taste, and many of them elegant. The most remarkable public buildings are,

15
Of the ca-
thedral.

1. *The Cathedral or High Church*, is a magnificent building, and its situation greatly to its advantage, as it stands higher than any part of the city. It has been intended to form a cross, though the traverse part has never been finished. The great tower is founded upon four large massy pillars, each of them about 30 feet in circumference. The tower itself is 25½ feet square within; and is surrounded by a balustrade, within which rises an octangular spire terminated by a fane. The tower upon the west end is upon the same level, but appears not to have been finished, though it is covered over with lead. In this tower is a very large bell 11 feet four inches in diameter. The principal entry was from the west; the gate 11 feet broad at the base, and 17 feet in height. The west end of the choir is now appropriated for a place of divine worship; and is divided from the remaining part by a stone partition, which is inclosed by another stone-wall parting it from the nave. It is impossible to form an adequate idea of the awful solemnity of the place occasioned by the loftiness of the roof and the range of pillars by which the whole is supported.

The nave of the church rises four steps higher than the choir; and on the west side stood the organ-loft, formerly ornamented with a variety of figures, but now defaced. The pillars here are done in a better taste than those in the choir, and their capitals are or-

namented with fruits. The arched roof of the altar is supported by five pillars, over which was a fine terrace walk, and above it a large window of curious workmanship, but now shut up. On the north side of the altar is the vestry, being a cube of 28 feet, the roof arched and vaulted at top, and supported by one pillar in the centre of the house. Arched pillars from every angle terminate in the grand pillar, which is 19 feet high. The lower part of the fourth cross is made use of as a burying place for the clergy of the city; and is by much the finest piece of workmanship in the whole building. It is 55 feet long, 28 broad, and 15 high; arched and vaulted at top, and supported by a middle range of pillars, with their capitals highly ornamented; corresponding to which are columns adjoining to the walls, which as they rise, spring into semi-arches, and are every where met at acute angles by their opposites, and are ornamented with carvings at the closing and crossing of the lines. At the east end of the choir you descend by flights of steps upon each side into passages which, in former times, were the principal entries to the burying vault which is immediately under the nave. It is now made use of as a parish church for the barony of Glasgow; and is full of pillars, some of them very massy, which support the arched roof: but it is a very uncomfortable place for devotion. The space under the altar and vestry, though now made use of as a burying-place by the heritors of the barony, was formerly, according to tradition, employed for keeping of the relics; and indeed, from the beautiful manner in which this place is finished, one would imagine that it had not been destined for common use. Here is shown the monument of St Mungo, or Kentigern, with his figure lying in a cumbent posture.

The whole length of the cathedral within the walls is 284 feet, its breadth 65; the height of the choir, from the floor to the canopy, 90 feet; the height of the nave, 85 feet; the height of the middle tower, 220 feet. This fabric was begun by John Achaius in 1123, and consecrated in 1136; and continued by succeeding bishops till such time as it was finished in the manner in which it stands at present. The wealth of the see of Glasgow, however, was not sufficient for so great an undertaking, so that they were obliged to have recourse to all the churches of Scotland for assistance in it.

This venerable edifice was in danger of falling a victim to the frenzy of fanaticism in 1579; and owed its preservation to the spirit and good sense of the tradesmen, who, upon hearing the beat of drum for collecting the workmen appointed to demolish it, flew to arms, and declared that the first man who pulled down a single stone should that moment be buried under it.

Near the cathedral are the ruins of the bishop's palace or castle, inclosed with a wall of hewn stone by archbishop James Beaton; the great tower built by archbishop Cameron in 1426.

2. *St Andrew's Church* was begun by the community in 1739, and finished in 1756. It is the finest piece of modern architecture in the city; and is built after the model of St Martin's in the Fields, London, whose architect was the famous Gibbs. The length of the

16
St An-
drew's
church.

Glasgow.

the church is 104 feet, and its breadth 66. It has a fine arched roof, well ornamented with figures in stucco, and sustained by stone-columns of the Corinthian order. Correspondent to the model, it has a place for the altar on the east, in which is a very ancient Venetian window; but the altar-place being seated, makes this end appear to no great advantage. The fronts of the galleries and the pulpit are done in mahogany in a very elegant manner. The spire by no means corresponds with the rest of the building; and, instead of being an ornament, disgraces this beautiful fabric. Its height is 170 feet.

Besides the cathedral (which contains three congregations) and St Andrew's church, there is a number of others, as the College-church, Ram's-horn, Tron, Wynd, &c. together with an English chapel, Highland church, several seceding meeting-houses, and others for sectaries of various denominations.

17
The college.

3. *The College.* The front of this building extends along the east side of the high street, and is upwards of 330 feet long. The gate at the entrance is decorated with rustics, and over it are the king's arms. The building consists of two principal courts or squares. The first is 88 feet long and 44 broad. The west side is elevated upon stone pillars, on which are placed pilasters supporting the Doric entablature, and ornamented with arches forming a piazza. Above these is the public hall; the ascent to which is by a double flight of steps inclosed by a handsome stone balustrade, upon the right of which is placed a lion, and on the left an unicorn, cut in free stone. The spire stands on the east side, is 135 feet high, and has a very good clock. Under this is the gateway into the inner and largest court, which is 103 feet long and 79 broad. Over the entry, in a niche, is a statue of Mr Zacharias Boyd, who was a benefactor to the university. On the east side of the court is a narrow passage leading into a handsome terrace walk, gravelled, 122 feet long by 64 feet broad. This walk is inclosed to the east by an iron palisade, in the centre of which is a gate leading into the garden. This last consists of seven acres of ground, laid out in walks for the recreation of the students; and there is also a botanic garden. On the south side of the walk stands the library; a very neat edifice, well constructed for the purpose intended, and containing a very valuable collection of books. Underneath are preserved in cases all the Roman inscriptions found on Graham's Dike, together with altars and other antiquities collected from different parts of Scotland.—Adjoining, there is an observatory, well furnished with astronomical instruments. The college also possesses, by bequest, the late Dr Hunter's famous anatomical preparations, library, and museum: And in the department of natural philosophy, it is furnished with an apparatus which is universally acknowledged to be the most extensive and useful in Britain, and which owes its perfection to the liberality and unremitting labour of Mr Anderson the present professor of that science.

18
Town
house, &c.

4. *The Tolbooth, or Town-House,* is a magnificent and extremely elegant building. The front is adorned with a range of Ionic pilasters; and is elevated on strong rusticated pillars with arches, forming a piazza for merchants and others to shelter themselves from the weather when met upon business. One of the apartments was the assem-

bly-hall; a neat room, 47 feet long, and 24 in breadth and height, finished in a good taste, though too small for the city. The town-hall is a very spacious and lofty apartment, 52 feet long by 27 broad, and 24 in height. It is finished in a very grand manner: the ceiling is divided into different compartments well ornamented. In it are full-length portraits of king James VI. and VII. Charles I. and II. William and Mary, queen Anne, king George I. II. and III. and Archibald duke of Argyle in his justiciary robes. The two last are by Ramsay. Opposite to the front of this building is the exchange-walk, which is well paved with free stone, and inclosed from the street by stone pillars. In the middle of this area is an equestrian statue of king William III. placed upon a lofty pedestal, and surrounded with an iron rail.—In 1781, the exchange under the piazzas was greatly enlarged, by taking down the lower part of the town-hall and assembly-room; and at the same time, by a tontine scheme entered into by the inhabitants, a most elegant coffee-room was added, with a suite of buildings adjoining for the purposes of a tavern and hotel, assembly-room, and offices for notaries and underwriters. The assembly-room, however, being found to be still too small, a subscription of above L. 5000 has been raised by a similar plan of a tontine for building a new one, which is proposed to be erected in the north corner of one of the new streets which join Ingram-street to Argyle-street.

5. *The Guild-Hall or Merchant's House.* This building is situated upon the south side of Bridge-gate street; and is in length 82 feet, in breadth 31. The great hall, which is the whole length and breadth of the building, is so capacious, that it is better adapted for the reception of great and numerous assemblies than any other in the city. This house is adorned with a very elegant spire 200 feet high.

19
Guild-hall

6. *The Town's Hospital* is a very neat building, consisting of two wings and a large front: the length 156 feet, the breadth of the centre 30 feet, and the depth of the wings 68 feet. Behind the building is an infirmary 127 feet long by 25 feet broad, the ascent to which is by a flight of steps. The lower part of this building is appointed for the reception of lunatics. The area between the buildings is large, which, with the agreeable open situation of the hospital on the river, must conduce to the health of the inhabitants.

20
Town's ho-
spital.

7. *The Grammar School* is situated on the new taken-in grounds to the north-west of the town, and was built in 1787. It is a very handsome building, containing a large hall, and six airy commodious teaching rooms. In this school there are four classes, the course being four years: each class is carried on the whole four years by the same master; so that, there being no rector, each master is head of the school one year in rotation. It is under the direction of a committee of the town-council; who assisted by the professors, clergy, and other persons of learning, frequently visit it during the session; and at an annual examination, prizes of books are distributed to the scholars according to their respective merits. The present number of scholars is above 300.—The building is not yet entirely finished; and the rooms which are not occupied by the Latin classes are intended for teaching writing, arithmetic, drawing, &c.

21
Grammar-
school.

8. *The New Bridge* is built in an elegant manner. New
It Bridge

22

Glasgow.

It is 32 feet wide; with a commodious foot-way for passengers, five feet broad on each side, raised above the road made for carriages, and paved with free stone. This bridge is about 500 feet in length; and consists of seven arches, the faces of which are wrought in rustic; with a strong block cornice above. The arches spring but a little way above low-water mark; which, though it renders the bridge stronger than if they sprung from taller piers, diminishes its beauty. Between every arch there is a small circular one: these break the force of the water when the river rises to a flood, and add to the strength of the whole. The parapet-wall or breast-work is cut out in the Chinese taste; and the two ends are finished off with a sweep. This bridge was begun in 1768, and finished in 1772.

23
Markets,
&c.

9. *The Markets in King's Street* are justly admired, as being the completest of their kind in Britain. They are placed on both sides of the street. That on the east side, appropriated entirely for butcher-meat, is 112 feet in length, and 67 in breadth. In the centre is a spacious gateway, decorated on each side with coupled Ionic columns, set upon their pedestals, and supporting an angular pediment. At the north end is a very neat hall belonging to the incorporation of butchers, the front ornamented with rustics and a pediment. The markets upon the west side of the street consist of three courts, set apart for fish, mutton, and cheese. The whole of the front is 173 feet, the breadth 46 feet; in the centre of which, as on the opposite side, is a very spacious gateway of the Dorick order, supporting a pediment. This is the entry to the mutton-market. Each of the other two has a well-proportioned arch faced with rusticks for their entrance. All these markets are well paved with free-stone; have walks all round them; and are covered over for shelter by roofs standing upon stone piers, under which the different commodities are exposed to sale. They have likewise pump-wells within, for cleansing away all the filth; which render the markets always sweet and agreeable. These markets were erected in 1754.

24
Guard-
house.

10. *The Herb-Market* is neat and commodious; and the principal entry is decorated with columns. It is situated in the Candleriggs, and is laid out in the same manner with the markets in King's-street.

11. *The Guard-House* is a very handsome building, with a piazza formed by arches, and columns of the Ionic order set upon their pedestals. It was originally situated on the Highstreet, at the corner of the Candleriggs street: but has lately been carried near half way up the Candleriggs, where it occupies the ground on which the weigh-house formerly stood, and is made larger and more commodious than it was before. An excellent new weigh-house has been erected at the head of the Candleriggs: And at the foot of the Candleriggs, or corner next the Highstreet, where the Guard-house was formerly situated, a superb new hotel has been built, containing 75 fire-rooms.

25
Public cha-
rities.

The most remarkable public charities in Glasgow are,
1. *Muirhead's or St Nicholas's Hospital*. This was originally appointed to subsist 12 old men and a chaplain: but its revenues have, from some unknown causes, been lost; so that no more of them now remains than the paltry sum of 139l. 2s. 5d. Scots money, 128l. of which is annually divided among four old men, at the rate of 2l. 13s. 4d. each.

No 139.

Glasgow.

2. *Hutchefon's Hospital*, was founded and endowed in 1639 by George Hutchefon of Lamb-hill notary-public, and Mr Thomas Hutchefon his brother who was bred a preacher, for the maintenance of old men and orphans. The funds of this hospital were increased by James Blair merchant in Glasgow in 1710, and by subsequent donations. From the sale of some of their lands which lay convenient for building, and the rise of the rest, the income is now above L. 1400, which is distributed in pensions to old people from L. 3 to L. 20, and in educating about 50 children.

3. *The Merchant's House* likewise distributes in pensions and other charities about L. 800 yearly.

4. *The Town's Hospital*, above described, was opened for the reception of the poor on the 15th of November 1733. The funds whence this hospital is subsisted are, the general session, the town-council, the trades house and merchants house, the interest of money belonging to their funds, which are sums that have been mortified for the use of the house. These supplies, however, are found insufficient to defray the expences of the house; for which reason an assessment is annually made upon the inhabitants in the following manner. The magistrates nominate 12, 14, or sometimes more gentlemen of known integrity and character, who have a list laid before them of all the inhabitants in town. This list they divide into 16 or 18 columns. Each of these columns contains the names of such inhabitants as carry on trade to a certain extent, or are supposed to be well able to pay the sum affixed to the particular column in which their names are inserted. If it is necessary to raise 500l. for instance, then each name, in every separate column, is valued at as much as the fortunes of the persons in each particular column are supposed to be. If 1000l. or more is to be raised, it is only continuing a proportional increase through the whole of the columns. The highest sum that ever was thus raised, was 12s. 6d. upon every thousand pounds that each person was supposed to be worth. The number of people maintained in this hospital are about 620.

5. *Wilson's Charity* for the education of boys, was founded by George Wilson, who in 1778 left 3000l. for that purpose. This fund is now considerably increased, and gives education and clothing to 48 boys, who each continues four years, so that 12 are admitted annually.

Besides these, there are many public schools for the education of children; as well as many institutions of private societies for the purpose of relieving the indigent and instructing youth, such as *Graham's Society*, *Buchanan's Society*, the *Highland Society*, &c. These last put annually 20 boys apprentices to trades, and during the first three years give them clothing and education.

The university of Glasgow owes its origin, as we have already observed, to bishop Turnbull. The institution consisted at first of a rector, a dean of faculty, a principal who taught theology, and three professors of philosophy; and, soon after this, the civil and canon laws were taught by some clergymen. From the time of its establishment in 1450 to the reformation in 1560, the college was chiefly frequented by those who were intended for the church; its members were all ecclesiastics, and its principal support was derived from the church. The reformation brought the university to

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Glasgow. the verge of destruction; masters, students, and servants, all forsook it. The magistrates were so sensible of the loss which the community had sustained by this desertion, that they endeavoured to restore it in 1572, by bestowing upon it considerable funds, and prescribing a set of regulations for its management. These, however, proved insufficient; for which reason king James VI. erected it anew, by a charter called the *Nova Erectio*, in 1577, and bestowed upon it the teinds of the parish of Govan. The persons who were to compose the new university were, a principal, three professors of philosophy, four students bursars, one æconomus, a principal's servant, a janitor, and cook.

Since the year 1577, the funds of the university have been considerably increased by the bounty of kings and the donations of private persons. The professors have therefore also been increased; so that at present the university of Glasgow consists of a chancellor, rector, dean of faculty, principal, and 14 professors (six of them in the gift of the crown), together with bursars, &c. The archbishop of Glasgow was formerly chancellor of the university *ex officio*; at present, the chancellor is chosen by the rector, dean of faculty, principal, and masters.

The chancellor, as being the head of the university, is the fountain of honour, and in his name are all academical degrees bestowed. The office of rector is to exercise that academical jurisdiction in disputes among the students themselves, or between the students and citizens, which is bestowed upon the greater part of the universities in Europe. He is chosen annually in the *comitia*; that is, in a meeting in which all the students, as well as the other members of the university, have a voice. Immediately after his admission, he has been in use to choose certain persons as his assessors and counsellors in his capacity of judge: and, in former periods, it was customary to name the ministers of Glasgow, or any other gentlemen who had no connection with the university; but, for a great while past, the rector has constantly named the dean of faculty, the principal, and masters, for his assessors; and he has always been, and still is, in the daily practice of judging in the causes belonging to him, with the advice of his assessors. Besides these powers as judge, the rector summons and presides in the meetings of the university for the election of his successor; and he is likewise in use to call meetings of the professors for drawing up addresses to the king, electing a member to the general assembly, and other business of the like kind.

The dean of faculty has, for his province, the giving directions with regard to the course of studies; the judging, together with the rector, principal, and professors, of the qualifications of those who desire to be created masters of arts, doctors of divinity, &c.; and he presides in meetings which are called by him for these purposes. He is chosen annually by the rector, principal, and masters.

The principal and masters, independent of the rector and dean, compose a meeting in which the principal presides; and as they are the persons for whose behoof chiefly the revenue of the college was established, the administration of that revenue is therefore committed to them. The revenue arises from the teinds of the parish of Govan, granted by king James VI. in 1557; from the teinds of the parishes of Renfrew

and Kilbride, granted by the same monarch in 1617, and confirmed by king Charles I. on the 28th of June 1630; from the teinds of the parishes of Calder, Old and New Monkland, conveyed to them by a charter from Charles II. in 1670; from a tack of the archbishoprick; and from several donations conferred by private persons.

The college of Glasgow, for a very considerable time after its erection, followed the mode of public teaching which is common even to this day in Oxford and Cambridge, and in many other universities throughout Europe; that is, each professor gave a few lectures every year, *gratis*, upon the particular science which he professed: but, in place of this, the professors have, for a great while past, adopted the mode of private teaching; that is, they lecture and examine two hours every day during the session, viz. from the 10th of October to the 10th of June; a method which comes much cheaper to the student, as he has it in his power, if he is attentive, to acquire his education without being under the necessity of employing a tutor. They have also private classes, in which they teach one hour *per* day. The number of students who have attended this college for several years past, has been upwards of 500 each season.

The trade of Glasgow is said to have been first promoted by one Mr William Elphinstone in 1420. This trade was most probably the curing and exporting of salmon; but the first authentic document concerning Glasgow as a trading city is in 1546. Complaints having been made by Henry VIII. king of England, that several English ships had been taken and robbed by vessels belonging to Scotland, an order of council was issued, discharging such captures for the future; and among other places made mention of in this order is the city of Glasgow. The trade which at that time they carried on could not be great. It probably consisted of a few small vessels to France loaded with pickled salmon; as this fishery was, even then, carried on to a considerable extent, by Glasgow, Renfrew, and Dumbarton. Between the year 1630 and 1660, a very great degree of attention seems to have been paid to inland commerce by the inhabitants of Glasgow. Principal Baillie informs us, that the increase of Glasgow arising from this commerce was exceedingly great. The exportation of salmon and of herrings were also continued and increased. In the war between Britain and Holland during the reign of Charles II. a privateer was fitted out in Clyde to cruise against the Dutch. She was called the *Lion of Glasgow*, Robert M'Allan commander; and carried five pieces of cannon, and 60 hands.

A spirit of commerce appears to have arisen among the inhabitants of Glasgow between the year 1660 and 1707. The citizens who distinguished themselves most during this period were Walter Gibson and John Anderson. Gibson cured and packed in one year 400 lasts of herrings, which he sent to St Martin's in France on board of a Dutch vessel, called the *St Agate*, of 450 tons burthen; his returns were brandy and salt. He was the first who imported iron from Stockholm into Clyde. Anderson is said to have been the first who imported white-wines.

Whatever their trade was at this time, it could not be considerable: the ports to which they were

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obliged to trade lay all to the eastward: the circumnavigation of the island would therefore prove an almost unsurmountable bar to the commerce of Glasgow; and of consequence the people on the east coast would be possessed of almost all the commerce of Scotland. The union with England opened a field for commerce for which the situation of Glasgow, so convenient in respect to the Atlantic, was highly advantageous. Since that time the commerce of the east coast has declined, and that of the west increased to an amazing degree. No sooner was the treaty of union signed, than the inhabitants of Glasgow began to prosecute the trade to Virginia and Maryland; they chartered vessels from Whitehaven, sent out cargoes of goods, and brought back tobacco in return. The method in which they at first proceeded in this trade, was certainly a very prudent one. A supercargo went out with every vessel. He bartered his goods for tobacco, until such time as he had either sold off his goods, or procured as much tobacco as was sufficient to load his vessel. He then immediately set out on his return; and if any of his goods remained unsold, he brought them home with him. While they continued to trade in this way, they were of great advantage to the country, by the quantity of manufactures which they exported; their own wealth began to increase; they purchased ships of their own; and, in 1718, the first vessel of the property of Glasgow crossed the Atlantic. Their imports of tobacco were now considerable, and Glasgow began to be looked upon as a considerable port; the tobacco-trade at the ports of Bristol, Liverpool, and Whitehaven, was observed to dwindle away; the people of Glasgow began to send tobacco to these places, and to undersell the English even in their own ports. Thus the jealousy of the latter was soon excited, and they took every method in their power to destroy the trade of Glasgow. The people of Bristol presented remonstrances to the commissioners of the customs at London against the trade of Glasgow, in 1717. To these remonstrances the merchants of Glasgow sent such answers to the commissioners as convinced them that the complaints of the Bristol merchants were without foundation. But in 1721, a most formidable confederacy was entered into by almost all the tobacco-merchants in South Britain against the trade of Glasgow. Those of London, Liverpool, and Whitehaven, presented severally to the Lords of the Treasury, petitions, arraigning the Glasgow merchants of frauds in the tobacco trade. To these petitions the Glasgow people gave in replies; and the Lords of the Treasury, after a full and impartial hearing, were pleased to dismiss the cause with the following sentence: "That the complaints of the merchants of London, Liverpool, and Whitehaven, were groundless; and that they proceeded from a spirit of envy, and not from a regard to the interest of trade, or of the king's revenue."

But the efforts of these gentlemen did not stop here. They brought their complaints into the House of Commons. Commissioners were sent to Glasgow in 1722, who gave in their reports to the house in 1723. The merchants sent up distinct and explicit answers to these reports; but such was the interest of their adversaries, that these answers were disregarded. New officers were appointed at the ports of Greenock and

Port-Glasgow, whose private instructions seem to have been, to ruin the trade if possible, by putting all imaginable hardships upon it. Hence it languished till the year 1735; but after that time it began to revive, though even after its revival it was carried on but slowly for a considerable space of time.

At last, however, the active and enterprising spirit of the merchants, seconding the natural advantages of their situation, prevailed over all opposition; and the American trade continued to flourish and increase until the year 1775, inasmuch that the importation of tobacco into Clyde that year from the provinces of Virginia, Maryland, and Carolina, amounted to 57,143 hogsheads. But since the breach with America, this trade has now fallen greatly off, and very large sums are said to remain due to the merchants from that quarter of the world.

With regard to the manufactures of Glasgow, Mr Gibson is of opinion that the commerce to America first suggested the idea of introducing them, in any considerable degree at least. The first attempts in this way were about the year 1725, and their increase for some time was very slow, nor did they begin to be considerable till great encouragement was given by the legislature to the linen manufacture in Scotland. The first causes of the success of this manufacture were the act of parliament in 1748, whereby the wearing of French cambrics was prohibited under severe penalties; that of 1751, allowing weavers in flax or hemp to settle and exercise their trades any where in Scotland free from all corporation-dues; and the bounty of three-halfpence per yard on all linens exported at and under 18d. per yard. Since that time a spirit of manufacture has been excited among the inhabitants of Glasgow; and great variety of goods, and in very great quantity, have been manufactured. Checks, linen, and linen and cotton, are manufactured to a great extent. Printed linens and cottons were begun to be manufactured in 1738; but they only made garments till 1754, when handkerchiefs were first printed.

Incles were first made here about the year 1732. The engine-looms used at that time were so inconvenient, and took up so much time in making the goods, that the Dutch, who were the only people possessed of the large incle-looms, were almost solely in possession of this manufacture. Mr Hervey, who began this branch in Glasgow, was so sensible of the disadvantages under which it laboured, that he went over to Holland; and in spite of the care and attention which the Dutch took to conceal their methods of manufacturing, he brought over with him from Haerlem two of their looms, and one of their workmen. This Dutchman remained some years in Glasgow; but on some disgust he went to Manchester, and instructed the people there in the method of carrying on the manufacture.

In 1757, carpets were begun to be made, and are now carried on to a considerable extent. Hunters cloths, English blankets, and other goods of the same kind, are also made.

Besides these, a great variety of articles are manufactured at Glasgow, of which our limits will not permit us to enter into a detail, such as soap, refining of sugar, iron-mongery, brass, jewellery, glass both common and white, pottery, &c. Types for printing are made in this city by Dr Wilson and Sons, equal

if not superior, in beauty to any others in Britain. Printing of books was first begun here by George Anderson about the year 1638. But there was no good printing in Glasgow till the year 1735, when Robert Urie printed several books in a very elegant manner. The highest perfection, however, to which printing hath yet been carried in this place, or perhaps in any other, was by the late Robert and Andrew Foulis, (who began in the year 1740); as the many correct and splendid editions of books printed by them in different languages sufficiently testify. Some of their classics, it is said, are held in such high esteem abroad, as to sell nearly at the price of ancient MSS. The same gentlemen also established an academy of painting; but the wealth of Scotland being unequal to the undertaking, it has been since given up.

Since the stagnation of the American trade, already noticed, the merchants of Glasgow have turned their attention more to manufactures, which have of late, especially that of cottons and muslins, increased in a very rapid degree, and bid fair for putting the city in a more flourishing condition than ever it was before. The manufacturing-houses, the influx of people for carrying on the manufactures, the means and encouragement which these afford to population, and the wealth thence derived by individuals as well as accruing to the community, have all tended lately to increase, and are daily increasing, the extent of the city and the elegance of the buildings. Besides various improvements in the old streets, several handsome new ones as well as new squares have been added. The site of these new buildings is the tract of rising ground already mentioned as the north boundary of the town previous to its late extension. The western part of it, which is perfectly level, is occupied by a spacious square, denominated *George's Square*; two sides of which are built and inhabited, and a third begun. The grass plot in the middle is inclosed with a handsome iron railing. The square is deficient in regularity; the houses on the west side being a story higher than those of the east; but in other respects it is very neat. To the east of this square are several new streets laid out and paved, and some of them almost completely built on. The principal, though as yet the most incomplete of those streets, is Ingram Street, which runs from east to west. From this the others begin; some of them being carried northward up the hill, others going southward and joining the main street of the town. One of the finest of these cross streets is Hutcheson Street.

The south boundary of the city was mentioned to be the Clyde. Over this river there are two bridges. One of them, the Old Bridge, built about 400 years ago by archbishop Rae, but since repaired and partly rebuilt, consists of eight arches; and connects the suburbs of Gorbals, situated on the opposite side of the river, with the city. The other is the New Bridge, described above.—On the banks of the river, eastward, is the Green; a spot appropriated to the use of the inhabitants, with conveniences for washing and drying linens, and with agreeable and extensive walks for recreation.

On the same or south side of the town, westward, is the Broomie-law, where the quay is situated. Till within these few years, the river here and for several

miles distance, was so shallow and so obstructed by shoals, as to admit only of small craft from Greenock, Port-Glasgow, and the Highlands: but of late it has been cleared and deepened so as to admit vessels of considerable burden; and it is intended to make the depth as nearly equal as possible to that of the canal, in order that the vessels from Ireland and the west coast may not be induced exclusively to ascend the west end of the canal and deliver their goods at Canal-baron, but may come up Clyde and unload at the Broomie-law.

The government of the city of Glasgow is vested in a provost and three bailies, a dean of guild, deacon-convenner, and a treasurer, with a common council of 13 merchants and 12 mechanics. The provost and two of the bailies must, by the set of the borough, be elected from the merchant rank, and the other bailie from the trades rank, *i. e.* the mechanics. The provost is, from courtesy and custom, styled *lord provost*. He is properly lord of the police of the city, president of the community, and is *ex officio* a justice of the peace for both the borough and county.

The revenue of the town arises from a duty upon all grain and meal brought into the city (which tax is denominated *the ladles*); from the rents of lands and houses the property of the community; from an impost of two pennies Scots upon every Scots pint of ale or beer brewed, inbrought, or sold, within the city; from certain dues payable out of the markets; from the rents of the seats in churches; from the dues of cranage at the quay, at the weigh-house, &c. As to the tonnage on the river, the pontage of the bridge, and statute-work; these, making no part of the city revenue, are kept separate and distinct under the management of commissioners appointed by act of parliament.

About the time of the union, the number of inhabitants in Glasgow was reckoned about 14,000. In 1765, when a new division of the parishes took place, they were estimated at 28,000. In 1785, when an accurate survey was made, the number was about 36,000; besides the suburbs, containing the Calton, Gorbals, and Anderston, reckoned about 1000. Since that time many new buildings, as above noticed, have been erected, and the city has become considerably more populous, but no exact estimate has been made; though it is generally thought that the number of inhabitants cannot at present be computed at much less than 50,000.

GLASS, a transparent, brittle, facitious body, produced from sand melted in a strong fire with fixed alkaline salts, lead, flags, &c. till the whole becomes perfectly clear and fine. The word is formed of the Latin *glasium*, a plant called by the Greeks *isatis*, by the Romans *vitrum*, by the ancient Britons *guadam*, and by the English *woad*. We find frequent mention of this plant in ancient writers, particularly Cæsar, Vitruvius, Pliny, &c. who relate, that the ancient Britons painted or dyed their bodies with *glasium*, *guadam*, *vitrum*, &c. *i. e.* with the blue colour procured from this plant. And hence, the facitious matter we are speaking of came to be called *glass*; as having always somewhat of this bluishness in it.

At what time the art of glass-making was first invented, is altogether uncertain. Some imagine it to

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have been invented before the flood: but of this we have no direct proof, though there is no improbability in the supposition; for we know, that it is almost impossible to excite a very violent fire, such as is necessary in metallurgic operations, without vitrifying part of the bricks or stones wherewith the furnace is built. This indeed might furnish the first hints of glass-making; tho' it is also very probable, that such imperfect vitrifications would be observed a long time before people thought of making any use of them.

Neri traces the antiquity of glass as far back as the time of Job. That writer, speaking of the value of wisdom, chap. xxviii. verse 17. says, that gold and crystal cannot equal it. But this word, which Neri will have to signify factitious glass, is capable of a great many different interpretations, and properly signifies only whatever is beautiful or transparent. Dr Merret will have the art to be as ancient as that of pottery or the making of bricks, for the reasons already given, viz. that by all vehement heat, some imperfect vitrifications are produced. Of this kind undoubtedly was the fossil glass mentioned by Ferant. Imperator: to have been found under-ground where great fires had been. But it is evident, that such imperfect vitrifications might have passed unnoticed for ages; and consequently we have no reason to conclude from thence, that the art of glass-making is of such high antiquity.

The Egyptians boast, that this art was taught them by their great Hermes. Aristophanes, Aristotle, Alexander, Aphrodiseus, Lucretius, and St John the divine, put it out of all doubt that glass was used in their days. Pliny relates, that it was first discovered accidentally in Syria, at the mouth of the river Belus, by certain merchants driven thither by a storm at sea; who being obliged to continue there, and dress their victuals by making a fire on the ground, where there was great plenty of the herb kali; that plant, burning to ashes, its salts mixed and incorporated with the sand, or stones fit for vitrification, and thus produced glass; and that, this accident being known, the people of Sidon in that neighbourhood essayed the work, and brought glass into use; since which time the art has been continually improving. Be this as it will, however, the first glass-houses mentioned in history were erected in the city of Tyre, and here was the only staple of the manufacture for many ages. The sand which lay on the shore for about half a mile round the mouth of the river Belus was peculiarly adapted to the making of glass, as being neat and glittering; and the wide range of the Tyrian commerce gave an ample vent for the productions of the furnace.

Mr Nixon, in his observations on a plate of glass, found at Herculaneum, which was destroyed A. D. 80, on which occasion Pliny lost his life, offers several probable conjectures, as to the uses to which such plates might be applied. Such plates, he supposes, might serve for *specula*, or looking-glasses; for Pliny, in speaking of Sidon, adds, *siquidem etiam specula excogitaverat*: the reflection of images from these ancient specula being effected by besmearing them behind, or tinging them through with some dark colour. Another use in which they might be employed, was for adorning the walls of their apartments, by way of wainscot, to which Pliny is supposed to refer by his *nitrea camera*, lib. xxxvi. cap. 25. § 64. Mr Nixon

farther conjectures, that these glass plates might be used for windows, as well as the lamina of lapis specularis and phengites, which were improvements in luxury mentioned by Seneca, and introduced in his time, Ep. xc. However, there is no positive authority relating to the usage of glass windows earlier than the close of the third century: *Manifestius est* (says Lactantius *), *mentem esse, quæ per oculos ea quæ sunt opposita, transpiciat; quasi per fenestras lucente vitro aut speculâ lapide obductas.*

The first time we hear of glass made among the Romans was in the reign of Tiberius, when Pliny relates that an artist had his house demolished for making glass malleable, or rather flexible; though Petronius Arbiter, and some others, assure us, that the emperor ordered the artist to be beheaded for his invention.

It appears, however, that before the conquest of Britain by the Romans, glass-houses had been erected in this island, as well as in Gaul, Spain, and Italy. Hence, in many parts of the country are to be found annulets of glass, having a narrow perforation and thick rim, denominated by the remaining Britons *gleineu naid-reedh*, or *glass adders*, and which were probably in former times used as amulets by the druids†. It can scarcely be questioned that the Britons were sufficiently well versed in the manufacture of glass, to form out of it many more useful instruments than the glass beads. History indeed assures us, that they did manufacture a considerable quantity of glass vessels. These, like their annulets, were most probably green, blue, yellow, or black, and many of them curiously streaked with other colours. The process in the manufacture would be nearly the same with that of the Gauls or Spaniards. The sand of their shores being reduced to a sufficient degree of fineness by art, was mixed with three-fourths of its weight of their nitre (much the same with our kelp), and both were melted together. The metal was then poured into other vessels, where it was left to harden into a mass, and afterwards replaced in the furnace, where it became transparent in the boiling, and was afterwards figured by blowing, or modelling in the lath, into such vessels as they wanted.

It is not probable that the arrival of the Romans would improve the glass manufacture among the Britons. The taste of the Romans at that time was just the reverse of that of the inhabitants of this island. The former preferred silver and gold to glass for the composition of their drinking vessels. They made indeed great improvements in their own at Rome, during the government of Nero. The vessels then formed of this metal rivalled the bowls of porcelain in their dearness, and equalled the cups of crystal in their transparency. But these were by far too costly for common use; and therefore, in all probability, were never attempted in Britain. The glass commonly made use of by the Romans was of a quality greatly inferior; and, from the fragments which have been discovered at the stations or towns of either, appear to have consisted of a thick, sometimes white, but mostly blue green, metal.

According to venerable Bede, artificers skilled in making glass for windows were brought over into England in the year 674, by abbot Benedict, who were employed in glazing the church and monastery of Weremouth. According to others, they were first brought over

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over by Wilfrid, bishop of Worcester, about the same time. Till this time the art of making such *glass* was unknown in Britain; though *glass* windows did not begin to be common before the year 1180; till this period they were very scarce in private houses, and considered as a kind of luxury, and as marks of great magnificence. Italy had them first, next France, from whence they came into England.

Venice, for many years, excelled all Europe in the fineness of its *glasses*; and in the thirteenth century, the Venetians were the only people that had the secret of making crystal looking *glasses*. The great *glass*-works were at Muran, or Murano, a village near the city, which furnished all Europe with the finest and largest *glasses*.

The *glass* manufacture was first begun in England in 1557: the finer sort was made in the place called Crutched Friars, in London; the fine flint *glass*, little inferior to that of Venice, was first made in the Savoy-house, in the Strand, London. This manufacture appears to have been much improved in 1635, when it was carried on with sea-coal or pit-coal instead of wood, and a monopoly was granted to Sir Robert Mansell, who was allowed to import the fine Venetian flint *glasses* for drinking, the art of making which was not brought to perfection before the reign of William III. But the first *glass* plates, for looking *glasses* and coach windows, were made, 1673, at Lambeth, by the encouragement of the duke of Buckingham; who, in 1670, introduced of the manufacture of fine *glass* into England, by means of Venetian artists, with amazing success. So that within a century past, the French and English have not only come up to, but even surpassed the Venetians, and we are now no longer supplied from abroad.

The French made a considerable improvement in the art of *glass*, by the invention of a method to cast very large plates, till then unknown, and scarce practised yet by any but themselves and the English. That court applied itself with a laudable industry to cultivate and improve the *glass* manufacture. A company of *glass*-men was established by letters patent; and it was provided by an arret, not only that the working in *glass* should not derogate any thing from nobility, but even that none but nobles should be allowed to work therein.

An extensive manufactory of this elegant and valuable branch of commerce was first established in Lancashire, about the year 1773, through the spirited exertions of a very respectable body of proprietors, who were incorporated by an act of parliament. From those various difficulties constantly attendant upon new undertakings, when they have to contend with powerful foreign establishments, it was for some time considerably embarrassed; but Government, of late, having taken off some restrictions that bore hard upon it, and made some judicious regulations relative to the mode of levying the excise duty, it now bids fair to rival, if not surpass, the most celebrated continental manufactures, both with respect to the quality, brilliancy, and size of its productions.

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With regard to the theory of vitrification, we are almost totally in the dark. In general, it seems to be that state in which solid bodies are, by the vehement action of fire, fitted for being dissipated or carried off in vapour. In all vitrifications there is a plentiful eva-

poration; and if any solid substance is carried off in vapour by the intense heat of a burning speculum, a vitrification is always observed previously to take place. The difference, then, between the state of fusion and vitrification of a solid body we may conceive to be, that in the former the element of fire acts upon the parts of the solid in such a manner as only to disjoin them, and render the substance fluid; but in vitrification the fire not only disjoins the particles, but combines with them in a latent state into a third substance; which, having now as much fire as it can contain, can receive no further change from that element except being carried off in vapour.

But though we are unable to effect this change upon solid bodies without a very violent heat, it is otherwise in the natural processes. By what we call *crystallization*, nature produces more perfect glasses than we can make with our furnaces. These are called *precious stones*; but in all trials they discover the essential properties of glass, and not of stones. The most distinguishing property of glass is its resisting the force of fire, so that this element cannot calcine or change it as it does other bodies, but can only melt it, and then carry it off in vapours. To this last all the precious stones are subject. The diamond (the hardest and most ponderous of them all) is dissipated in a less degree of heat than what would dissipate common glass. Nor can it be any objection to this idea, that some kinds of glass are capable of being converted into a kind of porcelain by a long-continued cementation with certain materials. This change happens only to those kinds of glass which are made of alkaline salt and sand; and Dr Lewis hath shown that this change is produced by the dissipation of the saline principle, which is the least fixed of the two. Glass, therefore, we may still consider as a substance upon which the fire has no other effect than either to melt or dissipate it in vapour.

The other properties of glass are very remarkable, some of which follow.

1. It is one of the most elastic bodies in nature. If the force with which glass-balls strike each other be reckoned 16, that wherewith they recede by virtue of their elasticity will be nearly 15.

2. When glass is suddenly cooled, it becomes exceedingly brittle; and this brittleness is sometimes attended with very surprising phenomena. Hollow bells made of annealed glass, with a small hole in them, will fly to pieces by the heat of the hand only, if the hole by which the internal and external air communicate be stopped with a finger. Lately, however, some vessels made of such annealed glass have been discovered, which have the remarkable property of resisting very hard strokes given from without, though they shiver to pieces by the shocks received from the fall of very light and minute bodies dropped into their cavities. These glasses may be made of any shape; all that needs be observed in making them is, that their bottom be thicker than their sides. The thicker the bottom is, the easier do the glasses break. One whose bottom is three fingers breadth in thickness, flies with as much ease at least as the thinnest glass. Some of these vessels have been tried with strokes of a mallet sufficient to drive a nail into wood tolerably hard, and have held good without breaking. They have also

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resisted the shock of several heavy bodies let fall into their cavities, from the height of two or three feet; as musket-balls, pieces of iron, or other metal, pyrites, jasper, wood, bone, &c. But this is not surprising, as other glasses of the same shape and size will do the same; but the wonder is, that taking a shiver of flint of the size of a small pea, and letting it fall into the glass only from the height of three inches, in about two seconds the glass flies, and sometimes at the very moment of the shock; nay, a bit of flint no larger than a grain, dropped into several glasses successively, though it did not immediately break them, yet when set by, they all flew in less than three quarters of an hour. Some other bodies produce the same effect with flint; as sapphire, diamond, porcelain, hard tempered steel; also marbles such as boys play with, and likewise pearls.

These experiments were made before the Royal Society; and succeeded equally when the glasses were held in the hand, when they were rested on a pillow, put in water, or filled with water. It is also remarkable, that the glasses broke upon having their bottoms slightly rubbed with the finger, though some of them did not fly till half an hour after the rubbing. If the glasses are every where extremely thin, they do not break in these circumstances.

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Attempts
to account
for it.

Some have pretended to account for these phenomena, by saying, that the bodies dropped into the vessels cause a concussion which is stronger than the cohesive force of the glass, and consequently that a rupture must ensue. But why does not a ball of iron, gold, silver, or copper, which are perhaps a thousand times heavier than the flint, produce the same effect? It is because they are not elastic. But surely iron is more elastic than the end of one's finger.—Mr Euler has endeavoured to account for these appearances from his principles of percussion. He thinks that this experiment entirely overthrows the opinion of those who measure the force of percussion by the *vis viva*, or absolute apparent strength of the stroke. According to his principles, the great hardness and angular figure of the flint, which makes the space of contact with the glass extremely small, ought to cause an impression on the glass vastly greater than lead, or any other metal; and this may account for the flint's breaking the vessel, though the bullet, even falling from a considerable height, does no damage.—Hollow cups made of green bottle-glass, some of them three inches thick at the bottom, were instantly broken by a shiver of flint, weighing about two grains, though they had resisted the shock of a musket-ball from the height of three feet.

That Mr Euler's theory cannot be conclusive more than the other, must appear evident from a very slight consideration. It is not by angular bodies alone that the glasses are broken. The marbles with which children play are round, and yet they have the same effect with the angular flint. Besides, if it was the mere force of percussion which broke the glasses, undoubtedly the fracture would always take place at the very instant of the stroke; but we have seen, that this did not happen sometimes till a very considerable space of time had elapsed. It is evident, therefore, that this effect is occasioned by the putting in motion some subtle fluid with which the substance of the glass is

filled; and that the motions of this fluid, when once excited in a particular part of the glass, soon propagate themselves through the whole or greatest part of it, by which means the cohesive power becomes at last too weak to resist them. There can be little doubt that the fluid just now mentioned is that of electricity. It is known to exist in glass in very great quantity; and it also is known to be capable of breaking glasses, even when annealed with the greatest care, if put into too violent a motion. Probably the cooling of glass hastily may make it more electric than is consistent with its cohesive power, so that it is broken by the least increase of motion in the electric fluid by friction or otherwise. This is evidently the case when it is broken by rubbing with the finger; but why it should also break by the mere contact of flint and the other bodies above mentioned, has not yet been satisfactorily accounted for.

A most remarkable phenomenon also is produced in glass tubes placed in certain circumstances. When these are laid before a fire in an horizontal position, having their extremities properly supported, they acquire a rotatory motion round their axis, and also a progressive motion towards the fire, even when their supports are declining from the fire, so that the tubes will move a little way up hill towards the fire. When the progressive motion of the tubes towards the fire is stopped by any obstacle, their rotation still continues. When the tubes are placed in a nearly upright posture, leaning to the right hand, the motion will be from east to west; but if they lean to the left hand, their motion will be from west to east; and the nearer they are placed to the perfectly upright posture, the less will the motion be either way.

If the tube is placed horizontally on a glass plane, the fragment, for instance, of coach window-glass, instead of moving towards the fire, it will move from it, and about its axis in a contrary direction to what it had done before; nay, it will recede from the fire, and move a little up-hill when the plane inclines towards the fire.—These experiments are recorded in the Philosophical Transactions*. They succeeded best with tubes about 20 or 22 inches long, which had in each end a pretty strong pin fixed in cork for an axis.

The reason given for these phenomena, is the swelling of the tubes towards the fire by the heat, which is known to expand all bodies. For, say the adopters of this hypothesis, granting the existence of such a swelling, gravity must pull the tube down when supported near its extremities; and a fresh part being exposed to the fire, it must also swell out and fall down, and so on.—But, without going farther in the explanation of this hypothesis, it may be here remarked, that the fundamental principle on which it proceeds is false: for though fire indeed makes bodies expand, it does not increase them in weight; and therefore the sides of the tube, though one of them is expanded by the fire, must still remain in *equilibrio*; and hence we must conclude, that the causes of these phenomena remain yet to be discovered.

4. Glass is less dilatable by heat than metalline substances, and solid glass-sticks are less dilatable than tubes. This was first discovered by Col. Roy, in making experiments in order to reduce barometers to a greater degree of exactness than hath hitherto been

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Rotation of
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before a
fire.

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Attempts
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Phil. Trans.
a vol. lxvii.

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Glasf. found practicable; and since his experiments were made, one of the tubes 18 inches long, being compared with a solid glass-rod of the same length, the former was found by a pyrometer to expand four times as much as the other, in a heat approaching to that of boiling oil.—On account of the general quality which glass has of expanding less than metal, M. de Luc recommends it to be used in pendulums: and he says it has also this good quality, that its expansions are always equable, and proportioned to the degrees of heat; a quality which is not to be found in any other substance yet known.

Ibid.
vol. lxviii.
p. 474.

5. Glass appears to be more fit for the condensation of vapours than metallic substances. An open glass filled with water, in the summer-time, will gather drops of water on the outside, just as far as the water in the inside reaches; and a person's breath blown on it, manifestly moistens it. Glass also becomes moist with dew, when metals do not. See DEW.

6. A drinking glass partly filled with water, and rubbed on the brim with a wet finger, yields musical notes, higher or lower as the glass is more or less full; and will make the liquor frisk and leap. See HARMONICA.

7. Glass is possessed of very great electrical virtues. See ELECTRICITY, *passim*.

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Materials
for glassf.

Materials for Making of Glass. The materials whereof glass is made, we have already mentioned to be sand and flint or stones.

See Sal-
fals.

1. The salt here used is procured from a sort of ashes brought from the Levant, called *polverine*, or *rochetta*; which ashes are those of a sort of water-plant called *kali**, cut down in summer, dried in the sun, and burnt in heaps, either on the ground, or on iron grates; the ashes falling into a pit, grow into a hard mass, or stone, fit for use. It may also be procured from common kelp, or the ashes of the *fucus vesiculosus*. See KELP, and FUCUS.

To extract the salt, these ashes, or *polverine*, are powdered and sifted, then put into boiling water, and there kept till one third of the water be consumed; the whole being stirred up from time to time, that the ashes may incorporate with the fluid, and all its salts be extracted: then the vessel is filled up with new water, and boiled over again, till one half be consumed; what remains is a sort of ley, strongly impregnated with salt. This ley, boiled over again in fresh coppers, thickens in about 24 hours, and shoots its salt; which is to be ladled out, as it shoots, into earthen pans, and thence into wooden vats to drain and dry. This done, it is grossly pounded, and thus put in a sort of oven, called *calcar*, to dry. It may be added, that there are other plants, besides *kali* and *fucus*, which yield a salt fit for glass: such are the common way-thistle, bramble, hops, wormwood, woad, tobacco, fern, and the whole leguminous tribe, as pease, beans, &c.

Pearl-ashes form a leading flux in the manufacture of glass, and mostly supply the place of the Levant-ashes, the barillas of Spain, and many other kinds, which were formerly brought here for making both glass and soap. See PEARL-ASHES.

There are other fluxes used for different kinds of glass, and for various purposes, as calcined lead, nitre,

sea-salt, borax, arsenic, smiths clinkers, and wood-ashes, containing the earth and lixivate salts as produced by incineration. With regard to these several fluxes, we may observe, in general, that the more calx of lead, or other metallic earth, enters into the composition of any glass, so much the more fusible, soft, coloured, and dense this glass is, and reciprocally.

The colours given to glass by calxes of lead, are shades of yellow: on the other hand, glasses that contain only saline fluxes partake of the properties of salts; they are less heavy, less dense, harder, whiter, more brilliant, and more brittle than the former; and glasses containing both saline and metallic fluxes do also partake of the properties of both these substances. Glasses too saline are easily susceptible of alteration by the action of air and water; especially those in which alkalis prevail; and these are also liable to be injured by acids. Those that contain too much borax and arsenic, though at first they appear very beautiful, quickly tarnish and become opaque when exposed to air. By attending to these properties of different fluxes, phlogistic or saline, the artist may know how to adjust the proportions of these to sand, or powdered flints, for the various kinds of glass. See the article VITRIFICATION.

2. The sand or stone, called by the artists *tarso*, is the second ingredient in glass, and that which gives it the body and firmness. These stones, Agricola observes, must be such as will fuse; and of these such as are white and transparent are best; so that crystal challenges the precedence of all others.

At Venice they chiefly use a sort of pebble, found in the river Tesino, resembling white marble, and called *cuogolo*. Indeed Ant. Neri assures us, that all stones which will strike fire with steel, are fit to vitrify: but Dr Morret shows, that there are some exceptions from this rule. Flints are admirable; and when calcined, powdered, and searced, make a pure white crystalline metal: but the expence of preparing them makes the masters of our glass-houses sparing of their use. Where proper stones cannot be so conveniently had, sand is used. The best for this purpose is that which is white, small, and shining; examined by the microscope, it appears to be small fragments of rock crystal. For green glass, that which is of a soft texture, and more gritty; it is to be well washed, which is all the preparation it needs. Our glass-houses are furnished with white sand for their crystal glasses from Lynn in Norfolk and Maidstone in Kent, and with the coarser for green-glass from Woolwich.

Some mention a third ingredient in glass, viz. manganese, a kind of pseudo-loadstone, dug up in Germany, Italy, and even in Mendip hills in Somersetshire. But the proportion hereof to the rest is very inconsiderable; beside, that it is not used in all glass. Its office is to purge off the natural greenish colour, and give it some other tincture required.

For this purpose it should be chosen of a deep colour, and free from specks of a metalline appearance, or a lighter cast; manganese requires to be well calcined in a hot furnace, and then to undergo a thorough levigation. The effect of manganese in destroying the colours of glass, and hence called the soap of glass, is accounted for by M. Montamy, in his *Traité des Couleurs pour la Peinture en Email*, in the following manner: the

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the manganese destroys the green, olive, and blue colours of glass, by adding to them a purple tinge, and by the mixture producing a blackish brown colour; and as blackness is caused merely by an absorption of the rays of light, the blackish tinge given to the glass by the mixture of colours, prevents the reflection of so many rays, and thus renders the glass less coloured than before. But the black produced by this substance suggests an obvious reason for using it very sparingly in those compositions of glass which are required to be very transparent. Nitre or saltpetre is also used with the same intention; for by destroying in a certain degree the phlogiston which gives a strong tinge of yellow to glass prepared with lead as a flux, it serves to free it from this coloured tinge; and in saline glasses, nitre is requisite in a smaller proportion to render them sufficiently transparent, as in the case of looking-glasses and other kinds of plates.

Kinds of Glass. The manufactured glass now in use may be divided into three general kinds; white transparent glass, coloured glass, and common green or bottle glass. Of the first kind there is a great variety; as the flint glass, as it is called with us, and the German crystal glass, which are applied to the same uses; the glass for plates for mirrors or looking-glasses; the glass for windows and other lights; and the glass for phials and small vessels. And these again differ in the substances employed as fluxes in forming them, as well as in the coarseness or fineness of such as are used for their body. The flint and crystal, mirror and best window glass, not only require such purity in the fluxes, as may render it practicable to free the glass perfectly from all colour; but for the same reason likewise, either the white Lynn sand, calcined flints, or white pebbles, should be used. The others do not demand the same nicety in the choice of the materials; though the second kind of window glass, and the best kind of phial, will not be so clear as they ought, if either too brown sand, or impure salts, be suffered to enter into their composition.

Of coloured glass there is a great variety of sorts, differing in their colour or other properties according to the occasions for which they are wanted. The differences in the latter kind depend on the accidental preparation and management of the artists by whom they are manufactured, as will be afterwards explained.

Furnace for the Making of Glass. In this manufacture there are three sorts of furnaces; one called *calcar* is for the frit; the second is for working the glass; the third serves to anneal the glass, and is called the *leer*. See Plate CCXX.

The *calcar* resembles an oven ten feet long, seven feet broad, and two deep: the fuel, which in Britain is sea-coal, is put into a trench on one side of the furnace; and the flame reverberating from the roof upon the frit calcines it. The glass-furnace, or working-furnace, is round, of three yards diameter, and two high; or thus proportioned. It is divided into three parts, each of which is vaulted. The lower part is properly called the *crown*, and is made in that form. Its use is to keep a brisk fire, which is never put out. The mouth is called the *bocca*. There are several holes in the arch of this crown, through which the flame passes into the second vault or partition, and reverber-

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rates into the ports filled with the ingredients above-mentioned. Round the insides are eight or more pots placed, and piling pots on them. The number of pots is always double that of the boccas or mouths, or of the number of workmen, that each may have one pot refined to work out of, and another for metal to refine in while he works out of the other. Through the working holes the metal is taken out of the pots, and the pots are put into the furnace; and these holes are stopped with moveable covers made of lute and brick, to screen the workmens eyes from the scorching flames. On each side of the bocca or mouth is a bocarella or little hole, out of which coloured glass or finer metal is taken from the piling pot. Above this oven there is the third oven or *leer*, about five or six yards long, where the vessels or glass are annealed or cooled: this part consists of a tower, besides the leer, into which the flame ascends from the furnace. The tower has two mouths, through which the glasses are put in with a fork, and set on the floor or bottom: but they are drawn out on iron pans, called *fraches*, through the leer, to cool by degrees; so that they are quite cold by the time they reach the mouth of the leer, which enters the farosel or room where the glasses are to be stowed.

But the green glass-furnace is square; and at each angle it has an arch for annealing or cooling glasses. The metal is wrought on two opposite sides, and on the other two they have their colours, into which are made linnet holes for the fire to come from the furnace to bake the frit, and to discharge the smoke. Fires are made in the arches to anneal the work, so that the whole process is done in one furnace.

These furnaces must not be of brick, but of hard sandy stones. In France, they build the outside of brick; and the inner part, to bear the fire, is made of a sort of fuller's earth, or tobacco-pipe clay, of which earth they also make their melting-pots. In Britain the pots are made of Sturbridge clay.

Mr Blancourt observes, that the worst and roughest work in this art is the changing the pots when they are worn out or cracked. In this case, the great working hole must be uncovered; the faulty pot must be taken out with iron hooks and forks, and a new one must be speedily put in its place, through the flames, by the hands only. For this work, the man guards himself with a garment made of skins, in the shape of a pantaloon, that covers him all but his eyes, and is made as wet as possible: the eyes are defended with a proper sort of glass.

Instruments for Making of Glass. The instruments made use of in this work, may be reduced to these that follow. A blowing-pipe, made of iron, about two feet and a half long, with a wooden handle. An iron rod, to take up the glass after it is blown, and to cut off the former. Scissors to cut the glass when it comes off from the first hollow iron. Shears to cut and shape great glasses, &c. An iron-ladle, with the end of the handle cased with wood, to take the metal out of the refining pot, to put it into the workmens pots. A small iron-ladle, cased in the same manner, to skim the alkalie salt that swims at top. Shovels, one like a peel, to take up the great glasses; another, like a fire-shovel, to feed the furnace with coals. A hooked iron fork, to stir the matter in the pots. An

iron

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iron rake for the same purpose, and to stir the frit. An iron fork, to change or pull the pots out of the furnace, &c.

Compositions for White and Crystal Glass. 1. To make *crystal glass*, take of the whitest tarso, pounded small, and seared as fine as flour, 200 pounds; of the salt of polverine 130 pounds; mix them together, and put them into the furnace called the *calcar*, first heating it. For an hour keep a moderate fire, and keep stirring the materials with a proper rake, that they may incorporate and calcine together; then increase the fire for five hours; after which take out the matter; which being now sufficiently calcined, is called *frit*. From the *calcar* put the frit in a dry place, and cover it up from the dust for three or four months. Now to make the glass or crystal: take of this crystal frit, called also *bollito*; set it in pots in the furnace, adding to it a due quantity of magnesia or manganese: when the two are fused, cast the fluor into fair water, to clear it of the salt called *sandiver*; which would otherwise make the crystal obscure and cloudy. This lotion must be repeated again and again, as often as needful, till the crystal be fully purged; or this scum may be taken off by means of proper ladles. Then set it to boil four, five, or six days; which done, see whether it have manganese enough; and if it be yet greenish, add more manganese, at discretion, by little and little at a time, taking care not to overdose it, because the manganese inclines it to a blackish hue. Then let the metal clarify, till it becomes of a clear and shining colour; which done, it is fit to be blown or formed into vessels at pleasure.

2. *Flint glass*, as it is called by us, is of the same general kind with that which in other places is called crystal glass. It has this name from being originally made with calcined flints, before the use of the white sand was understood; and retains the name, though no flints are now used in the composition of it. This flint glass differs from the other, in having lead for its flux, and white sand for its body; whereas the fluxes used for the crystal glass are salts or arsenic, and the body consists of calcined flints or white river pebbles, tarso, or such stones. To the white sand and lead a proper proportion of nitre is added, to burn away the phlogiston of the lead, and also a small quantity of magnesia; and in some works they use a proportional quantity of arsenic to aid the fluxing ingredients. The most perfect kind of flint glass may be made by fusing with a very strong fire 120 pounds of the white sand, 50 pounds of red lead, 40 pounds of the best pearl-ashes, 20 pounds of nitre, and five ounces of magnesia. Another composition of flint glass, which is said to come nearer to the kind now made, is the following: 120 pounds of sand, 54 pounds of the best pearl-ashes, 36 pounds of red-lead, 12 pounds of nitre, and 6 ounces of magnesia. To either of these a pound or two of arsenic may be added, to increase the flux of the composition. A cheaper composition of flint glass may be made with 120 pounds of white sand, 35 pounds of the best pearl-ashes, 40 pounds of red-lead, 13 pounds of nitre, 6 pounds of arsenic, and 4 ounces of magnesia; or instead of the arsenic may be substituted 15 pounds of common salt; but this will be more brittle than the other. The cheapest composition for the worst kind of flint glass consists of 120 pounds of white sand,

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30 pounds of red-lead, 20 pounds of the best pearl-ashes, 10 pounds of nitre, 15 pounds of common salt, and six pounds of arsenic. The best German crystal glass is made of 120 pounds of calcined flints or white sand, 70 pounds of the best pearl-ashes, 10 pounds of saltpetre, half a pound of arsenic, and five ounces of magnesia. And a cheaper composition is formed of 120 pounds of calcined flints or white sand, 46 pounds of pearl-ashes, 7 pounds of nitre, 6 pounds of arsenic, and 5 ounces of magnesia.

A glass much harder than any prepared in the common way, may be made by means of borax in the following method: Take four ounces of borax, and an ounce of fine sand; reduce both to a subtile powder, and melt them together in a large close crucible set in a wind furnace, keeping up a strong fire for half an hour; then take out the crucible, and when cold break it, and there will be found at the bottom a pure hard glass capable of cutting common glass like a diamond. This experiment, duly varied, says Dr Shaw, may lead to several useful improvements in the arts of glass, enamels, and factitious gems, and shows an expeditious method of making glass, without any fixed alkali, which has been generally thought an essential ingredient in glass, and it is not yet known whether calcined crystal or other substances being added to this salt instead of sand, it might not make a glass approaching to the nature of a diamond.

There are three principal kinds of glasses, distinguished by the form or manner of working them; viz. I. *Round glass*, as those of our vessels, phials, drinking-glasses, &c. II. *Table or window-glass*, of which there are divers kinds; viz. crown-glass, jealous-glass, &c. III. *Plate-glass*, or *mirror-glass*.

I. *Working or Blowing Round Glass.* The working furnace, we have observed, is round, and has six bocas or apertures: at one of these called the *great boca*, the furnace is heated, and the pots of frit are at this set in the furnace; two other smaller holes, called *bocarellas*, serve to lade or take out the melted metal, at the end of an iron, to work the glass. At the other holes they put in pots of fusible ingredients, to be prepared, and at last emptied into the lading-pot.

There are six pots in each furnace, all made of tobacco-pipe clay, proper to sustain not only the heat of the fire, but also the effect of the polverine, which penetrates every thing else. There are only two of these pots that work: the rest serve to prepare the matter for them. The fire of the furnace is made and kept up with dry hard wood, cast in without intermission at six apertures.

When the matter contained in the two pots is sufficiently vitrified, they proceed to blow or fashion it. For this purpose the workman dips his blowing pipe into the melting-pot; and by turning it about, the metal sticks to the iron more firmly than turpentine. This he repeats four times, at each time rolling the end of his instrument, with the hot metal thereon, on a piece of plate-iron; over which is a vessel of water which helps to cool, and so to consolidate and to dispose that matter to bind more firmly with what is to be taken next out of the melting pot. But after he has dipped a fourth time, and the workman perceives there is metal enough on the pipe, he claps his mouth immediately to the other end of it, and blows gently

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Glas. through the iron tube, till the metal lengthens like a bladder about a foot. Then he rolls it on a marble stone a little while to polish it; and blows a second time, by which he brings it to the shape of a globe of about 18 or 20 inches diameter. Every time he blows into the pipe, he removes it quickly to his cheek; otherwise he would be in danger, by often blowing, of drawing the flame into his mouth: and this globe may be flattened by returning it to the fire; and brought into any form by stamp-irons, which are always ready. When the glass is thus blown, it is cut off at the collet or neck; which is the narrow part that stuck to the iron. The method of performing this is as follows: the pipe is rested on an iron bar, close by the collet; then a drop of cold water being laid on the collet, it will crack about a quarter of an inch, which, with a slight blow or cut of the shears, will immediately separate the collet.

After this is done, the operator dips the iron rod into the melting-pot, by which he extracts as much metal as serves to attract the glass he has made, to which he now fixes this rod at the bottom of his work, opposite to the opening made by the breaking of the collet. In this position the glass is carried to the great bocca or mouth of the oven, to be heated and scalded; by which means it is again put into such a soft state, that, by the help of an iron instrument, it can be pierced, opened, and widened, without breaking. But the vessel is not finished till it is returned to the great bocca; where being again heated thoroughly, and turned quickly about with a circular motion, it will open to any size, by the means of the heat and motion.

If there remain any superfluities, they are cut off with the shears; for till the glass is cool, it remains in a soft flexible state. It is therefore taken from the bocca, and carried to an earthen bench, covered with brands, which are coals extinguished, keeping it turning; because that motion prevents any settling, and preserves an evenness in the face of the glass, where, as it cools, it comes to its consistency; being first cleared from the iron rod by a slight stroke by the hand of the workman.

If the vessel conceived in the workman's mind, and whose body is already made, requires a foot, or a handle, or any other member or decoration, he makes them separately; and now essays to join them with the help of hot metal, which he takes out of the pots with his iron-rod: but the glass is not brought to its true hardness till it has passed the leer or annealing oven, described before.

II. *Working or Blowing of Window or Table GLASS.* The method of working round glass, or vessels of any sort, is in every particular applicable to the working of window or table glass, till the blowing iron has been dipt the fourth time. But then instead of rounding it, the workman blows, and so manages the metal upon the iron plate, that it extends two or three feet in the form of a cylinder. This cylinder is put again to the fire, and blown a second time, and is thus repeated till it is extended to the dimensions required, the side to which the pipe is fixed diminishing gradually till it ends in a pyramidal form; so that, to bring both ends nearly to the same diameter, while the glass is thus flexible, he adds a little hot metal to the end

Glas. opposite the pipe, and draws it out with a pair of iron pincers, and immediately cuts off the same end with the help of a little cold water, as before.

The cylinder being now open at one end, is carried back to the bocca; and there, by the help of cold water, it is cut about eight or ten inches from the iron pipe or rod; and the whole length at another place, by which also it is cut off from the iron rod. Then it is heated gradually on an earthen table, by which it opens in length; while the workman, with an iron tool, alternately lowers and raises the two halves of the cylinder; which at last will open like a sheet of paper, and fall into the same flat form in which it serves for use; in which it is preserved by heating it over again, cooling it on a table of copper, and hardening it 24 hours in the annealing furnace, to which it is carried upon forks. In this furnace an hundred tables of glass may lie at a time, without injury to each other, by separating them into tens, with an iron shiver between, which diminishes the weight by dividing it, and keeps the tables flat and even.

Of window or table glass there are various sorts, made in different places, for the use of building. Those most known among us are given us by the author of the Builder's Dictionary, as follows:

1. *Crown*, of which, says Neri, there are two kinds, distinguished by the places where they are wrought; viz. Ratcliff crown glass, which is the best and clearest, and was first made at the Bear-garden, on the Bank-side, Southwark, but since at Ratcliff: of this there are 24 tables to the case, the tables being of a circular form, about three feet six inches in diameter. The other kind, or Lambeth crown glass, is of a darker colour than the former, and more inclining to green.

The best window or crown glass is made of white sand 60 pounds, of purified pearl ashes 30 pounds, of saltpetre 15 pounds, of borax one pound, and of arsenic half a pound. If the glass should prove yellow, magnesia must be added. A cheaper composition for window glass consists of 60 pounds of white sand, 25 pounds of unpurified pearl ashes, 10 pounds of common salt, 5 pounds of nitre, 2 pounds of arsenic, and one ounce and a half of magnesia. The common or green window glass is composed of 60 pounds of white sand, 30 pounds of unpurified pearl ashes, 10 pounds of common salt, 2 pounds of arsenic, and two ounces of magnesia. But a cheaper composition for this purpose consists of 120 pounds of the cheapest white sand, 30 pounds of unpurified pearl-ashes, 60 pounds of wood ashes, well burnt and sifted, 20 pounds of common salt, and 5 pounds of arsenic.

2. *French glass*, called also *Normandy glass*, and formerly *Lorraine glass*, because made in those provinces. At present it is made wholly in the nine glass-works; five whereof are in the forest of Lyons, four in the county of Eu; the last at Beaumont near Rouen. It is of a thinner kind than our crown glass; and when laid on a piece of white paper, appears of a dirtyish green colour. There are but 25 tables of this to the case.

3. *German glass*, is of two kinds, the *white* and the *green*: the first is of a whitish colour, but is subject to those small curved streaks observed in our Newcastle glass, though free from the spots and blemishes thereof. The green, besides its colour, is liable to the same streaks

streaks as the white; but both of them are straighter and less warped than our Newcastle glass.

4. *Dutch glass* is not much unlike our Newcastle glass either in colour or price. It is frequently much warped like that, and the tables are but small.

5. *Newcastle glass* is that most used in England. It is of an ash-colour, and much subject to specks, streaks, and other blemishes; and besides is frequently warped. Leybourn says, there are 45 tables to the case, each containing five superficial feet: some say there are but 35 tables, and six feet in each table.

6. *Phial glass* is a kind betwixt the flint glass and the common bottle or green glass. The best kind may be prepared with 120 pounds of white sand, 50 pounds of unpurified pearl-ashes, 10 pounds of common salt, 5 pounds of arsenic, and 5 ounces of magnesia. The composition for green or common phial glass consists of 120 pounds of the cheapest white sand, 80 pounds of wood ashes well burnt and sifted, 20 pounds of pearl-ashes, 15 pounds of common salt, and 1 pound of arsenic.

The common bottle or green is formed of sand of any kind fluxed by the ashes of burnt wood, or of any parts of vegetables; to which may be added the *scoria* or clinkers of forges. When the softest sand is used, 200 pounds of wood ashes will suffice for 100 pounds of sand, which are to be ground and mixed together. The composition with the clinkers consists of 170 pounds of wood-ashes, 100 pounds of sand, and 50 pounds of clinkers or *scoria*, which are to be ground and mixed together. If the clinkers cannot be ground, they must be broke into small pieces, and mixed with the other matter without any grinding.

III. *Working of Plate or Mirror Glass.* 1. The materials of which this glass is made are much the same those of other works of glass, viz. an alkali as salt and sand.

The salt, however, should not be that extracted from pulverine or the ashes of the Syrian kali, but that from *BARILLA*, growing about Alicant in Spain. It is very rare that we can have the barilla pure; the Spaniards in burning the herb make a practice of mixing another herb along with it, which alters its quality; or of adding sand to it to increase the weight, which is easily discovered if the addition be only made after the boiling of the ashes, but next to impossible if made in the boiling. It is from this adulteration that those threads and other defects in plate glass arise. To prepare the salt, they clean it well of all foreign matters; pound or grind it with a kind of mill, and finally sift it pretty fine.

Pearl-ashes, properly purified, will furnish the alkali salt requisite for this purpose; but it will be necessary to add borax or common salt, in order to facilitate the fusion, and prevent the glass from stiffening in that degree of heat in which it is to be wrought into plates. For purifying the pearl-ashes, dissolve them in four times their weight of boiling water, in a pot of cast iron, always kept clean from rust. Let the solution be removed into a clean tub, and remain there 24 hours or longer. Having decanted the clear part of the fluid from the dregs or sediment, put it again in the iron pot, and evaporate the water till the salts are left perfectly dry. Preserve them in stone-jars, well secured from air and moisture.

Pearl-ashes may also be purified in the highest degree, so as to be proper for the manufacture of the most transparent glass, by pulverizing three pounds of the best pearl-ashes with six ounces of saltpetre in a glass or marble mortar, till they are well mixed; and then putting part of the mixture into a large crucible, and exposing it in a furnace to a strong heat. When this is red-hot, throw in the rest gradually; and when the whole is red-hot, pour it out on a moistened stone or marble, and put it into an earthen or clean iron pot, with ten pints of water; heat it over the fire till the salts be entirely melted; let it then stand to cool, and filter it through paper in a pewter cullender. When it is filtered, put the fluid again into the pot, and evaporate the salt to dryness, which will then be as white as snow; the nitre having burnt all the phlogistic matter that remained in the pearl-ashes after their former calcination.

As to the sand, it is to be sifted and washed till such time as the water come off very clear; and when it is well dried again, they mix it with the salt, passing the mixture through another sieve. This done, they lay them in the annealing furnace for about two hours; in which time the matter becomes very light and white: in this state they are called *frit* or *fritta*; and are to be laid up in a dry clean place, to give them time to incorporate: they lie here for at least a year.

When they would employ this frit, they lay it for some hours in the furnace, adding to some the fragments or shards of old and ill made glasses; taking care first to calcine the shards by heating them red-hot in the furnace, and thus casting them into cold water. To the mixture must likewise be added manganese, to promote the fusion and purification.

The best composition for looking-glass plates consists of 60 pounds of white sand cleaned, 25 pounds of purified pearl-ashes, 15 pounds of saltpetre, and 7 pounds of borax. If a yellow tinge should affect the glass, a small proportion of magnesia, mixed with an equal quantity of arsenic, should be added. An ounce of the magnesia may be first tried; and if this proves insufficient, the quantity should be increased.

A cheaper composition for looking-glass plate consists of 60 pounds of the white-sand, 20 pounds of pearl-ashes, 10 pounds of common salt, 7 pounds of nitre, 2 pounds of arsenic, and 1 pound of borax. The matter of which the glasses are made at the famous manufacture of St Gobin in France, is a composition of folder and of a very white sand, which are carefully cleaned of all heterogeneous bodies; afterwards washed for several times, and dried so as to be pulverized in a mill, consisting of many pebbles, which are moved by horses. When this is done, the sand is sifted through silk sieves and dried.

The matter thus far prepared is equally fit for plate-glass, to be formed either for blowing or by casting.

The largest glasses at St Gobin are run; the middle-sized and small ones are blown.

2. *Blowing the plates.* The workhouses, furnaces, &c. used in the making of this kind of plate-glass, are the same, except that they are smaller, and that the carquaisles are disposed in a large covered gallery, over against the furnace, as those in the following article, to which the reader is referred.

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After the materials are vitrified by the heat of the fire, and the glass is sufficiently refined, the workman dips in his blowing-iron, six feet long, and two inches in diameter, sharpened at the end which is put in the mouth, and widened at the other, that the matter may adhere to it. By this means he takes up a small ball of matter, which sticks to the end of the tube by constantly turning it. He then blows into the tube, that the air may swell the annexed ball; and carrying it over a bucket of water, which is placed on a support at the height of about four feet, he sprinkles the end of the tube to which the matter adheres, with water, still turning it, that by this cooling the matter may coalesce with the tube, and be fit for sustaining a greater weight. He dips the tube again into the same pot, and proceeds as before; and dipping it in the pot a third time, he takes it out, loaded with matter, in the shape of a pear, about ten inches in diameter, and a foot long, and cools it at the bucket; at the same time blowing into the tube, and with the assistance of a labourer, giving it a balancing motion, he causes the matter to lengthen; which, by repeating this operation several times, assumes the form of a cylinder, terminating like a ball at the bottom, and in a point at the top. The assistant is then placed on a stool three feet and a half high; and on this stool there are two upright pieces of timber, with a cross beam of the same, for supporting the glass and tube, which are kept in an oblique position by the assistant, that the master workman may with a punchion set in a wooden handle, and with a mallet make a hole in the mass: this hole is drilled at the centre of the ball that terminates the cylinder, and is about an inch in diameter. When the glass is pierced, the defects of it are perceived; if it is tolerably perfect, the workman lays the tube horizontally on a little iron tressel, placed on the support of the aperture of the furnace. Having exposed it to the heat for about half a quarter of an hour, he takes it away, and with a pair of long and broad shears, extremely sharp at the end, widens the glass, by insinuating the shears into the hole made with the punchion, whilst the assistant, mounted on the stool, turns it round, till at last the opening is so large as to make a perfect cylinder at bottom. When this is done, the workman lays his glass upon the tressels at the mouth of the furnace to heat it: he then gives it to his assistant on the stool, and with large shears cuts the mass of matter up to half its height. There is at the mouth of the furnace an iron tool called *pontil*, which is now heating, that it may unite and coalesce with the glass just cut, and perform the office which the tube did before it was separated from the glass. This *pontil* is a piece of iron six feet long, and in the form of a cane or tube, having at the end of it a small iron bar, a foot long, laid equally upon the long one, and making with it a T. This little bar is full of the matter of the glass, about four inches thick. This red-hot *pontil* is presented to the diameter of the glass, which coalesces immediately with the matter round the *pontil*, so as to support the glass for the following operation. When this is done, they separate the tube from the glass, by striking a few blows with a chissel upon the end of the tube which has been cooled; so that the glass breaks directly, and makes this separation, the tube being discharged of the glass

now adhering to the *pontil*. They next present to the furnace the *pontil* of the glass, laying it on the tressel to heat, and reddening the end of that glass, that the workman may open it with his shears, as he has already opened one end of it, to complete the cylinder; the assistant holding it on his stool as before. For the last time, they put the *pontil* on the tressel, that the glass may become red-hot, and the workman cuts it quite open with his shears, right over-against the fore-mentioned cut; this he does as before, taking care that both cuts are in the same line. In the mean time, the man who looks after the *carquaisse* comes to receive the glass upon an iron shovel two feet and a half long without the handle, and two feet wide, with a small border of an inch and a half to the right and left, and towards the handle of the shovel. Upon this the glass is laid, flattening it a little with a small stick a foot and a half long, so that the cut of the glass is turned upwards. They separate the glass from the *pontil*, by striking a few gentle blows between the two with a chissel. The glass is then removed to the mouth of the hot *carquaisse*, where it becomes red-hot gradually; the workman, with an iron tool six feet long, and widened at the end in form of a club at cards four inches long, and two inches wide on each side, very flat, and not half an inch thick, gradually lifts up the cut part of the glass to unfold it out of its form of a flattened cylinder, and render it smooth, by turning it down upon the hearth of the *carquaisse*. The tool already described being insinuated within the cylinder, performs this operation by being pushed hard against all the parts of the glass. When the glass is thus made quite smooth, it is pushed to the bottom of the *carquaisse* or annealing furnace with a small iron raker, and ranged there with a little iron hook. When the *carquaisse* is full, it is stopped and cemented as in the case of run glasses, and the glass remains there for a fortnight to be annealed; after which time they are taken out to be polished. A workman can make but one glass in an hour, and he works and rests for six hours alternately.

Such was the method formerly made use of for blowing plate-glass, looking-glasses, &c.; but the workmen, by this method, could never exceed 50 inches in length, and a proportional breadth, because what were larger were always found to warp, which prevented them from reflecting the objects regularly, and wanted substance to bear the necessary grinding. These imperfections have been remedied by the following invention of the *Sieur Abraham Thevart*, in France, about the year 1688.

3. *Casting or Running of Large Mirror-Glass Plates.* The furnace is of a very large dimension, environed with several ovens, or annealing furnaces, called *carquaisse*s, besides others for making of frit and calcining old pieces of glass. This furnace, before it is fit to run glass, costs 3500*l*. It seldom lasts above three years, and even in that time it must be refitted every six months. It takes six months to rebuild it, and three months to refit it. The melting pots are as big as large hogsheds, and contain about 2000 weight of metal. If one of them bursts in the furnace, the loss of the matter and time amounts to 250*l*. The materials in these pots are the same as described before. When the furnace is red hot, these materials are put in at three different

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times, because that helps the fusion; and in 24 hours they are vitrified, refined, settled, and fit for casting. A is the bocca, or mouth of the furnace; B is the cistern that conveys the liquid glass it receives out of the melting-pots in the furnace to the casting table. These cisterns are filled in the furnace, and remain therein six hours after they are filled; and then are hooked out by the means of a large iron chain, guided by a pulley, placed upon a carriage with four wheels marked C, by two men. This carriage has no middle piece; so that when it has brought the cistern to the casting-table D, they slip off the bottom of the cistern, and out rushes a torrent of flaming matter upon the table: this matter is confined to certain dimensions by the iron rulers EE, which are moveable, retain the fluid matter, and determine the width of the glass; while a man, with the roller F resting on the edge of the iron rulers, reduceth it as it cools to an equal thickness, which is done in the space of a minute. This table is supported on a wooden frame, with trussles for the convenience of moving to the annealing furnace; into which, strewed with sand, the new plate is shoved, where it will harden in about 10 days.

What is most surprising throughout the whole of this operation, is the quickness and address wherewith such massy cisterns, filled with a flaming matter, are taken out of the furnace, conveyed to the table, and poured therein, the glass spread, &c. The whole is inconceivable to such as have not been eye-witnesses of that surprising manufacture.

As fast as the cisterns are emptied, they carry them back to the furnace and take fresh ones, which they empty as before. This they continue to do so long as there are any full cisterns; laying as many plates in each carquaisse as it will hold, and stopping them up with doors of baked earth, and every chink with cement, as soon as they are full, to let them anneal, and cool again, which requires about 14 days.

The first running being dispatched, they prepare another, by filling the cisterns anew from the matter in the pots; and after the second, a third; and even a fourth time, till the melting-pots are quite empty.

The cisterns at each running should remain at least six hours in the furnace to whiten; and when the first annealing furnace is full, the casting-table is to be carried to another. It need not here be observed, that the carquaises, or annealing furnaces, must first have been heated to the degree proper for them. It may be observed, that the oven-full, or the quantity of matter commonly prepared, supplies the running of 18 glasses, which is performed in 18 hours, being an hour for each glass. The workmen work six hours, and are then relieved by others.

When the pots are emptied, they take them out, as well as the cisterns, to scrape off what glass remains, which otherwise would grow green by continuance of fire, and spoil the glasses. They are not filled again in less than 36 hours, so that they put the matter into the furnace, and begin to run it every 54 hours.

The manner of heating the large furnaces is very singular: the two tisors, or persons employed for that purpose, in their shirts, run swiftly round the furnace without making the least stop: as they run along, they take two billets, or pieces of wood, which are cut for the purpose; these they throw into the first tiffart;

and continuing their course, do the same for the second. This they hold without interruption for six hours successively; after which they are relieved by others, &c. It is surprising that two such small pieces of wood, and which are consumed in an instant, should keep the furnace to the proper degree of heat; which is such, that a large bar of iron, laid at one of the mouths of the furnace, becomes red-hot in less than half a minute.

The glass, when taken out of the melting-furnace, needs nothing farther but to be ground, polished, and foliated.

4. *Grinding and Polishing of Plate-GLASS.* Glass is made transparent by fire; but it receives its lustre by the skill and labour of the grinder and polisher; the former of whom takes it rough out of the hands of the maker.

In order to grind plate-glass, they lay it horizontally upon a flat stone table made of a very fine-grained free-stone; and for its greater security they plaster it down with lime or stucco; for otherwise the force of the workmen, or the motion of the wheel with which they grind it, would move it about.

This stone table is supported by a strong frame A, made of wood, with a ledge quite round its edges, rising about two inches higher than the glass. Upon this glass to be ground is laid another rough glass not above half so big, and so loose as to slide upon it; but cemented to a wooden plank, to guard it from the injury it must otherwise receive from the scraping of the wheel to which this plank is fastened, and from the weights laid upon it to promote the grinding or triture of the glasses. The whole is covered with a wheel B, made of hard light wood, about six inches in diameter, by pulling of which backwards and forwards alternately, and sometimes turning it round, the workmen, who always stand opposite to each other, produce a constant attrition between the two glasses, and bring them to what degree of smoothness they please, by first pouring in water and coarse sand; after that, a finer sort of sand, as the work advanceth, till at last they must pour in the powder of smalt. As the upper or incumbent glass polishes and grows smoother, it must be taken away, and another from time to time put in its place.

This engine is called a *mill* by the artists, and is used only in the largest-sized glasses; for in the grinding of the lesser glasses, they are content to work without a wheel, and to have only four wooden handles fastened to the four corners of the stone which loads the upper plank, by which they work it about.

When the grinder has done his part, who finds it very difficult to bring the glass to an exact plainness, it is turned over to the polisher; who, with the fine powder of tripoli stone or emery, brings it to a perfect evenness and lustre. The instrument made use of in this branch is a board, cc, furnished with a felt, and a small roller, which the workman moves by means of a double handle at both ends. The artist, in working this roller, is assisted with a wooden hoop or spring to the end of which it is fixed: for the spring, by constantly bringing the roller back to the same points, facilitates the action of the workman's arm.

Colouring of GLASS. That the colours given to glass may have their full beauty, it must be observed, that every

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every pot when new, and first used, leaves a foulness in the glass from its own earthy parts; so that a coloured glass made in a new pot can never be bright or perfectly fine. For this reason, the larger of these, when new, may be glazed with white glass; but the second time of using the pots lose this foulness. The glazing may be done by reducing the glass to powder, and moistening the inside of the pot with water; while it is yet moist, put in some of the powdered glass, and shake it about, till the whole inner surface of the pot be covered by as much as will adhere to it, in consequence of the moisture. Throw out the redundant part of the powdered glass; and the pot being dry, set it in a furnace sufficiently hot to vitrify the glass adhering to it, and let it continue there some time; after which, care must be taken to let it cool gradually. Those pots which have served for one colour must not be used for another; for the remainder of the old matter will spoil the colour of the new. The colours must be very carefully calcined to a proper degree; for if they are calcined either too much or too little, they never do well; the proper proportion, as to quantity, must also carefully be regarded, and the furnaces must be fed with dry hard wood. And all the processes succeed much the better if the colour be used dividedly, that is, a part of it in the frit, and the rest in the melted metal.

A hard glass, proper for receiving colours, may be prepared by pulverising 12 pounds of the best sand, cleaned by washing in a glass or flint mortar, and mixing seven pounds of pearl-ashes, or any fixed alkaline salt, purified with nitre, one pound of salt-petre, and half a pound of borax, and pounding them together. A glass less hard may be prepared of twelve pounds of white sand cleaned, seven pounds of pearl-ashes purified with saltpetre, one pound of nitre, half a pound of borax, and four ounces of arsenic, prepared as before.

Amethyst coloured. See *Purple* below, and the article **AMETHYST.**

Balas-colour. Put into a pot crystal frit, thrice washed in water; tinge this with manganese, prepared into a clear purple; to this add *alumen cativum*, sifted fine, in small quantities, and at several times: this will make the glass grow yellowish, and a little reddish, but not blackish, and always dissipates the manganese. The last time you add manganese give no more of the *alumen cativum*, unless the colour be too full. Thus will the glass be exactly of the colour of the balas-ruby. See *Ruby GLASS.*

The common black colour. The glass makers take old broken glass of different colours, grind it to powder, and add to it, by different parcels, a sufficient quantity of a mixture of two parts zaffir and one part manganese: when well purified, they work it into vessels, &c.

Glass beads are coloured with manganese only.

Black velvet colour. To give this deep and fine colour to glass, take of crystalline and pulverine frit, of each 20 pounds; of calx of lead and tin four pounds; set all together in a pot in the furnace, well heated; when the glass is formed and pure, take steel well calcined and powdered, scales of iron that fly off from the smith's anvil, of each an equal quantity; powder and mix them well; then put six ounces of this powder to

the above described metal while in fusion; mix the whole thoroughly together, and let them all boil strongly together; then let it stand in fusion 12 hours to purify, and after this work it. It will be a most elegant velvet black.

There is another way of doing this, which also produces a very fair black. It is this: take a hundred weight of rochetta frit, add to this two pounds of tartar and six pounds of manganese, both in fine powder; mix them well, and put them to the metal while in fusion, at different times, in several parcels; let it stand in fusion after this for four days, and then work it.

A glass perfectly black may also be formed to ten pounds of either of the compositions for hard glass above described, one ounce of zaffer, six drams of manganese, and an equal quantity of iron strongly calcined.

Blue colour. A full blue may be made by adding six drams of zaffer and two drams of manganese to ten pounds of either of the compositions for hard glass, described above. For a very cool or pure blue glass, half an ounce of calcined copper may be used instead of the manganese, and the proportion of zaffer diminished by one half. Glass resembling sapphire may be made with ten pounds of either of the compositions for hard glass, three drams and one scruple of zaffer, and one dram of the *calx cassii*, or precipitation of gold by tin; or instead of this latter ingredient, two drams and two scruples of manganese. Or a sapphire-coloured glass may be made by mixing with any quantity of the hard glass one eighth of its weight of smalt. For a beautiful blue glass produced from the calx of regulus of cobalt, see **CHEMISTRY, n° 1299.**

Venetian brown, with gold spangles, commonly called the *philosopher's stone*, may be prepared in the following manner: take of the second composition for hard glass above described, and of the composition for paste, of each five pounds, and of highly calcined iron an ounce; mix them well, and fuse them till the iron be perfectly vitrified, and has tinged the glass of a deep transparent yellow brown colour. Powder this glass, and add to it two pounds of powdered glass of antimony; grind them together, and thus mix them well. Take part of this mixture, and rub into it 80 or 100 leaves of the counterfeit leaf gold called *Dutch gold*; and when the parts of the gold seem sufficiently divided, mix the powder containing it with the other part of the glass. Fuse the whole with a moderate heat till the powder run into a vitreous mass, fit to be wrought into any of the figures or vessels into which it is usually formed; but avoid a perfect liquefaction, because that in a short time destroys the equal diffusion of the spangles, and vitrifies, at least in part, the matter of which they are composed; converting the whole into a kind of transparent olive-coloured glass. This kind of glass is used for a great variety of toys and ornaments with us, who at present procure it from the Venetians.

Chalcedony. A mixture of several ingredients with the common matter of glass, will make it represent the semi-opaque gems, the jaspers, agates, chalcedonies, &c. The way of making these seems to be the same with the method of making marbled paper, by several colours dissolved in several liquors, which are such as will

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will not readily mix with one another when put into water, before they are cast upon the paper which is to be coloured. There are several ways of making these variously coloured glasses, but the best is the following.

Dissolve four ounces of fine leaf silver in a glass vessel in strong aquafortis; stop up the vessel, and set it aside.—In another vessel, dissolve five ounces of quicksilver in a pound of aquafortis, and set this aside.—In another glass vessel, dissolve in a pound of aquafortis three ounces of fine silver, first calcined in this manner: amalgamate the silver with mercury, mix the amalgam with twice its weight of common salt well purified, put the mixture in an open fire in a crucible, that the mercury may fly off, and the silver be left in form of powder. Mix this powder with an equal quantity of common salt well purified, and calcine this for six hours in a strong fire; when cold, wash off the salt by repeated boilings in common water, and then put the silver into the aquafortis. Set this solution also aside.—In another vessel, dissolve in a pound of aquafortis three ounces of sal ammoniac; pour off the solution, and dissolve in it a quarter of an ounce of gold. Set this also aside.—In another vessel, dissolve three ounces of sal ammoniac in a pound of aquafortis; then put into the solution cinnabar, crocus martis, ultramarine, and ferretto of Spain, of each half an ounce. Set this also aside.—In another vessel, dissolve in a pound of aquafortis three ounces of sal ammoniac; then put into it crocus martis made with vinegar, calcined tin, zaffer, and cinnabar, of each half an ounce; let each of these be powdered very fine, and put gently into the aquafortis. Set this also aside.—In another vessel, dissolve three ounces of sal ammoniac in a pound of aquafortis, and add to it brass calcined with brimstone, brass thrice calcined, manganese, and scales of iron which fall from the smith's anvil, of each half an ounce; let each be well powdered, and put gently into the vessel. Then set this also aside.—In another vessel, dissolve two ounces of sal ammoniac in a pound of aquafortis, and put to it verdigrease an ounce, red lead, crude antimony, and the caput mortuum of vitriol, of each half an ounce; put these well powdered leisurely into the vessel, and set this also aside.—In another vessel, dissolve two ounces of sal ammoniac in a pound of aquafortis, and add orpiment, white arsenic, painters lake, of each half an ounce.

Keep the above nine vessels in a moderate heat for 15 days, shaking them well at times. After this pour all the matters from these vessels into one large vessel, well luted at its bottom; let this stand six days, shaking it at times; and then set it in a very gentle heat, and evaporate all the liquor, and there will remain a powder of a purplish green.

When this is to be wrought, put into a pot very clear metal, made of broken crystalline and white glass that has been used; for with the virgin-frit, or such as has never been wrought, the chalcedony can never be made, as the colours do not stick to it, but are consumed by the frit. To every pot of 20 pounds of this metal put two or three ounces of this powder at three several times; incorporate the powder well with the glass; and let it remain an hour between each time of putting in the powders. After all are in, let it stand 24 hours; then let the glass be well mixed, and

take an assay of it, which will be found of a yellowish blue; return this many times into the furnace; when it begins to grow cold, it will show many waves of different colours very beautifully. Then take tartar eight ounces, foot of the chimney two ounces, crocus martis made with brimstone, half an ounce; let these be well powdered and mixed, and put them by degrees into the glass at six times, waiting a little while between each putting in. When the whole is put in, let the glass boil and settle for 24 hours; then make a little glass body of it; which put in the furnace many times, and see if the glass be enough, and whether it have on the outside veins of blue, green, red, yellow, and other colours, and have, beside these veins, waves like those of the chalcedonies, jaspers, and oriental agates, and if the body kept within looks as red as fire.

When it is found to answer thus, it is perfect, and may be worked into toys and vessels, which will always be beautifully variegated: these must be well annealed, which adds much to the beauty of their veins. Masses of this may be polished at the lapidary's wheel as natural stones, and appear very beautiful. If in the working the matter grow transparent, the work must be stopped, and more tartar, foot, and crocus martis must be put to it, which will give it again the necessary body and opacity, without which it does not show the colours well.

Chrysolite colour may be made of ten pounds of either of the compositions for hard glass described above, and six drams of calcined iron.

Red cornelian colour may be formed by adding one pound of glass of antimony, two ounces of the calcined vitriol called *scarlet ochre*, and one dram of manganese or magnesia, to two pounds of either of the compositions for hard glass. The glass of antimony and magnesia are first fused with the other glass, and then powdered and ground with the scarlet ochre: the whole mixture is afterwards fused with a gentle heat till all the ingredients are incorporated. A glass resembling the white cornelian may be made of two pounds of either of the compositions for hard glass, and two drams of yellow ochre well washed, and one ounce of calcined bones: grind them together, and fuse them with a gentle heat.

Emerald colour. See *Green* below.

Garnet colour. To give this colour to glass, the workmen take the following method. They take equal quantities of crystal and rochetta frit, and to every hundred weight of this mixture they add a pound of manganese and an ounce of prepared zaffer: these are to be powdered separately, then mixed and added by degrees to the frit while in the furnace. Great care is to be taken to mix the manganese and zaffer very perfectly; and when the matter has stood 24 hours in fusion, it may be worked.

Glass of this kind may be made by adding one pound of glass of antimony, one dram of manganese, and the same quantity of the precipitate of gold by tin, to two pounds of either of the compositions for hard glass; or the precipitate of gold may be omitted, if the quantities of the glass of antimony and manganese be doubled.

Gold colour. This colour may be produced by taking ten pounds of either of the compositions for hard glass,

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glass, omitting the saltpetre; and for every pound adding an ounce of calcined borax, or, if this quantity doth not render the glass sufficiently fusible, two ounces; ten ounces of red tartar of the deepest colour; two ounces of magnesia; and two drams of charcoal of fallow, or any other soft kind. Precipitates of silver baked on glass will stain it yellow, and likewise give a yellow colour on being mixed and melted with 40 or 50 times their weight of vitreous compositions: the precipitate from aquafortis by fixed alkali seems to answer best. Yellow glasses may also be obtained with certain preparations of iron, particularly with Prussian blue. But Dr Lewis observes, that the colour does not constantly succeed, nor approach to the high colour of gold, with silver or with iron. The nearest imitations of gold which he has been able to produce have been effected with antimony and lead. Equal parts of the glass of antimony, of flint calcined and powdered, and of minium, formed a glass of a high yellow; and with two parts of glass of antimony, two of minium, and three of powdered flint, the colour approached still more to that of gold. The last composition exhibited a multitude of small sparkles interspersed throughout its whole substance, which gave it a beautiful appearance in the mass, but were really imperfections, owing to air-bubbles.

Neri directs, for a gold-yellow colour, one part of red tartar and the same quantity of manganese, to be mixed with a hundred parts of frit. But Kunckel observes, that these proportions are faulty; that one part, or one and a quarter, of manganese, is sufficient for a hundred of frit; but that six parts of tartar are hardly enough, unless the tartar is of a dark red colour, almost blackish; and that he found it expedient to add to the tartar about a fourth of its weight of powdered charcoal. He adds, that the glass swells up very much in melting, and that it must be left unstirred, and worked as it stands in fusion. Mr Samuel More, in repeating and varying this process in order to render the colour more perfect, found that the manganese is entirely unessential to the gold colour; and that the tartar is no otherwise of use than in virtue of the coaly matter to which it is in part reduced by the fire, the phlogiston or inflammable part of the coal appearing in several experiments to be the direct tinging substance. Mr Pot also observes, that common coals give a yellow colour to glass; that different coaly matters differ in their tinging power; that caput mortuum of foot and lamp-black answer better than common charcoal; and that the sparkling coal, which remains in the retort after the rectification of the thick empyreumatic animal oils, is one of the most active of these preparations. This preparation, he says, powdered, and then burnt again a little in a close vessel, is excellent for tinging glass, and gives yellow, brown, reddish, or blackish colours, according to its quantity; but the frit must not be very hard of fusion, for in this case the strong fire will destroy the colouring substance before the glass melts: and he has found the following compositions to be nearly the best; viz. sand two parts, alkali three parts; or sand two, alkali three, calcined borax one; or sand two, alkali two, calcined borax one; and though saltpetre is hardly used at all, or very sparingly, for yellow glasses, as it too much volatilizes the colouring substance; yet here for the most

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part a certain proportion of it, easily determined by trial, is very necessary; for without it the concentrated colouring matter is apt to make the glass too dark, and even of an opaque pitchy blackness. It does not certainly appear that there is any material diversity in the effects of different coals, the difference being probably owing to the different quantities of the inflammable matter which they contain; so that a little more shall be required of one kind than of another for producing the same degree of colour in the glass. Nor does the softness or fusibility of the frit appear to be in any respect necessary.

Gold-coloured spangles may be diffused through the substance of glass, by mixing the yellow talcs with powdered glass, and bringing the mixture into fusion.

Green. This colour may be imparted to glass by adding three ounces of copper precipitated from aquafortis, and two drams of precipitated iron to nine pounds of either of the compositions for hard glass. The finest method of giving this beautiful colour to glass is this: Take five pounds of crystalline metal that has been passed several times through water, and the same quantity of the common white metal of pulverine, four pounds of common pulverine frit, and three pounds of red lead; mix the red-lead well with the frit, and then put all into a pot in a furnace. In a few hours the whole mass will be well purified: then cast the whole into water, and separate and take out the lead; then return the metal into the pot, and let it stand a day longer in fusion; then put in the powder of the residuum of the vitriol of copper, and a very little crocus martis, there will be produced a most lively and elegant green, scarce inferior to that of the oriental emerald. There are many ways of giving a green to glass, but all are greatly inferior to this.—To make a *sea-green*, the finest crystalline glass only must be used, and no manganese must be added at first to the metal. The crystal frit must be melted thus alone; and the salt, which swims like oil on its top, must be taken off with an iron ladle very carefully. Then to a pot of twenty pound of this metal add six ounces of calcined brals, and a fourth part of the quantity of powdered zaffer: this powder must be well mixed, and put into the glass at three times; it will make the metal swell at first, and all must be thoroughly mixed in the pot. After it has stood in fusion three hours, take out a little for a proof: if it be too pale, add more of the powder. Twenty-four hours after the mixing the powder the whole will be ready to work; but must be well stirred together from the bottom, lest the colour should be deepest there, and the metal at the top less coloured, or even quite colourless. Some use for this purpose half crystal frit and half rochetta frit, but the colour is much the finest when all crystal frit is used.

Lapis lazuli colour. See LAPIS LAZULI.

Opal colour. See OPAL.

Purple of a deep and bright colour may be produced by adding to ten pounds of either of the compositions for hard glass, above described, six drams of zaffer and one dram of gold precipitated by tin; or to the same quantity of either composition one ounce of manganese and half an ounce of zaffer. The colour of amethyst may be imitated in this way.

Red. A blood-red glass may be made in the following

lowing manner: Put six pounds of glass of lead, and ten pounds of common glass, into a pot glazed with white glass. When the whole is boiled and refined, add by small quantities, and at small distances of time, copper calcined to a redness as much as on repeated proofs is found sufficient: then add tartar in powder by small quantities at a time, till the glass is become as red as blood; and continue adding one or other of the ingredients till the colour is quite perfect.

Ruby. The way to give the true fine red of the ruby, with a fair transparency, to glass, is as follows: Calcine in earthen vessels gold dissolved in aqua-regia; the menstruum being evaporated by distillation, more aqua-regia added; and the abstraction repeated five or six times, till it becomes a red powder. This operation will require many days in a hot furnace. When the powder is of a proper colour, take it out: and when it is to be used, melt the finest crystal glass, and purify it by often casting it into water; and then add, by small quantities, enough of this red powder to give it the true colour of a ruby, with an elegant and perfect transparency.

The process of tinging glass and enamels by preparations of gold was first attempted about the beginning of the last century. Libavius, in one of his tracts intitled *Alchymia*, printed in 1606, conjectures that the colour of the ruby proceeds from gold, and that gold dissolved and brought to redness might be made to communicate a like colour to facitious gems and glass. On this principle Neri, in his *Art of Glass*, dated in 1611, gives the process above recited. Glauber in 1648 published a method of producing a red colour by gold, in a matter which is of the vitreous kind, though not perfect glass. For this purpose he ground powdered flint or sand with four times its weight of fixed alkaline salt: this mixture melts in a moderately strong fire, and when cold looks like glass, but exposed to the air runs into a liquid state. On adding this liquor to solution of gold in aqua-regia, the gold and flint precipitate together in form of a yellow powder, which by calcination becomes purple. By mixing this powder with three or four times its weight of the alkaline solution of flint, drying the mixture, and melting it in a strong fire for an hour, a mass is obtained of a transparent ruby colour, and of a vitreous appearance; which nevertheless is soluble in water, or by the moisture of the air, on account of the redundancy of the salt. The honourable Mr Boyle, in a work published in 1680, mentions an experiment in which a like colour was introduced into glass without fusion; for having kept a mixture of gold and mercury in digestion for some months, the fire was at last immoderately increased, so that the glass burst with a violent explosion; and the lower part of the glass was found tinged throughout of a transparent red colour, hardly to be equalled by that of rubies.

About the same time Cassius is said to have discovered the precipitation of gold by tin, and that glass might be tinged of a ruby colour by melting it with this precipitate; though he does not appear, says Dr Lewis, from his treatise *De Auro*, to have been the discoverer of either. He describes the preparation of the precipitate and its use; but gives no account of the manner of employing it, only that he says one

dram of gold duly prepared will tinge ten pounds of glass.

This process was soon after brought to perfection by Kunckel; who says, that one part of the precipitate is sufficient to give a ruby colour to 1280 parts of glass, and a sensible redness to upwards of 1900 parts; but that the success is by no means constant. Kunckel also mentions a purple-gold powder, resembling that of Neri; which he obtained by inspissating solution of gold to dryness; abstracting from it fresh aqua-regia three or four times, till the matter appears like oil; then precipitating with strong alkaline ley, and washing the precipitate with water. By dissolving this powder in spirit of salt and precipitating again, it becomes, he says, extremely fair; and in this state he directs it to be mixed with a due proportion of Venice glass.

Orschal, in a treatise intitled *Sol sine Veste*, gives the following process for producing a very fine ruby. He directs the purple precipitate made by tin to be ground with six times its quantity of Venice glass into a very fine powder, and this compound to be very carefully mingled with the frit or vitreous composition to be tinged. His frit consists of equal parts of borax, nitre, and fixed alkaline salt, and four times as much calcined flint as of each of the salts; but he gives no directions as to the proportion of the gold precipitate or mode of fusion. Hellot describes a preparation, which, mixed with Venice glass, was found to give a beautiful purple enamel. This preparation consists of equal parts of solution of gold and of solution of zinc in aqua-regia mixed together, with the addition of a volatile salt prepared from sal ammoniac by quicklime, in sufficient quantity to precipitate the two metals. The precipitate is then gradually heated till it acquires a violet colour. However, though a purple or red colour, approaching to that of ruby, may, by the methods above recited, be baked on glass or enamels, and introduced into the mass by fusion, the way of equally diffusing such a colour through a quantity of fluid glass is still, says Dr Lewis, a secret. The following process for making the ruby glass was communicated to Dr Lewis by an artist, who ascribed it to Kunckel. The gold is directed to be dissolved in a mixture of one part of spirit of salt and three of aquafortis, and the tin in a mixture of one part of the former of these acids with two of the latter. The solution of gold being properly diluted with water, the solution of tin is added, and the mixture left to stand till the purple matter has settled to the bottom. The colourless liquor is then poured off, and the purple sediment, while moist and not very thick, is thoroughly mixed with powdered flint or sand. This mixture is well ground with powdered nitre, tartar, borax, and arsenic, and the compound melted with a suitable fire. The proportions of the ingredients are 2560 parts of sand, 384 of nitre, 240 of tartar, 240 of borax, 28 of arsenic, 5 of tin, and 5 of gold.

Topaz colour. Glass resembling this stone may be made by pulverizing ten pounds of either of the compositions for hard glass with an equal quantity of the gold-coloured glass, and fusing them together.

White opaque and semitransparent glass may be made of ten pounds of either of the compositions for hard glass and one pound of well calcined horn, ivory, or bone;

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or an opake whiteness may be given to glass by adding one pound of very white arsenic to ten pounds of flint glass. Let them be well powdered and mixed by grinding them together, and then fused with a moderate heat till they are thoroughly incorporated. A glass of this kind is made in large quantities at a manufacture near London; and used not only for different kinds of vessels, but as a white ground for enamel in dial-plates and snuff-boxes, which do not require finishing with much fire, because it becomes very white and fusible with a moderate heat.

Yellow. See *Gold colour* above.

Painting in GLASS. The ancient manner of painting in glass was very simple: it consisted in the mere arrangement of pieces of glass of different colours in some sort of symmetry, and constituted what is now called *Mosaic work*. See *MOSAIC*.

In process of time they came to attempt more regular designs, and also to represent figures heightened with all their shades: yet they proceeded no farther than the contours of the figures in black with water-colours, and hatching the draperies after the same manner on glasses of the colour of the object they designed to paint. For the carnation, they used glass of a bright red colour; and upon this they drew the principal lineaments of the face, &c. with black.

At length, the taste for this sort of painting improving considerably, and the art being found applicable to the adorning of churches, basilics, &c. they found out means of incorporating the colours in the glass itself, by heating them in the fire to a proper degree; having first laid on the colours. A French painter at Marseilles is said to have given the first notion of this improvement, upon going to Rome under the pontificate of Julius II.; but Albert Durer and Lucas of Leyden were the first that carried it to any height.

This art, however, has frequently met with much interruption, and sometimes been almost totally lost; of which Mr Walpole gives us the following account, in his *Anecdotes of Painting in England*.

"The first interruption given to it was by the reformation, which banished the art out of churches; yet it was in some measure kept up in the escutcheons of the nobility and gentry in the windows of their seats. Towards the end of queen Elizabeth's reign it was omitted even there; yet the practice did not entirely cease. The chapel of our Lady at Warwick was ornamented anew by Robert Dudley earl of Leicester, and his countess, and the cipher of the glass painter's name yet remains, with the date 1574: and in some of the chapels at Oxford the art again appears, dating itself in 1622, by the hand of no contemptible master.

"I could supply even this gap of 48 years by many dates on Flemish glass: but nobody ever supposed that the secret was lost so early as the reign of James I. and that it has not perished since will be evident from the following series, reaching to the present hour.

"The portraits in the windows of the library at All Souls, Oxford. In the chapel at Queen's College there are twelve windows dated 1518. P. C. a cipher on the painted glass in the chapel at Warwick, 1574. The windows at Wadham-college: the drawing pretty good, and the colours fine, by Bernard Van Linge, 1622. In the chapel at Lincoln's Inn, a window, with the name Bernard, 1623. This was

probably the preceding Van Linge. In the church of St Leonard, Shoreditch, two windows by Baptista Sutton, 1634. The windows in the chapel at University-college, Hen. Giles *pinsit*, 1687. At Christ-church, Isaac Oliver; aged 84, 1700. Window in Merton-chapel, William Price, 1700. Windows at Queen's New-college, and Maunlin, by William Price, the son, now living, whose colours are fine, whose drawing is good, and whose taste in ornaments and mosaic is far superior to any of his predecessors; is equal to the antique, to the good Italian masters, and only surpassed by his own singular modesty.

"It may not be unwelcome to the curious reader to see some anecdotes of the revival of taste for painted glass in England. Price, as we have said, was the only painter in that style for many years in England. Afterwards one Rowell, a plumber at Reading, did some things, particularly for the late Henry earl of Pembroke; but Rowell's colours soon vanished. At last he found out a very durable and beautiful red; but he died in a year or two, and the secret with him. A man at Birmingham began the same art in 1756 or 1757, and fitted up a window for Lord Lyttelton, in the church of Hagely; but soon broke. A little after him, one Peckitt at York began the same business, and has made good proficiency. A few lovers of that art collected some dispersed panes from ancient buildings, particularly the late Lord Cobham, who erected a Gothic temple at Stowe, and filled it with arms of the old nobility, &c. About the year 1753, one Ascioti, an Italian, who had married a Flemish woman, brought a parcel of painted glass from Flanders, and sold it for a few guineas to the honourable Mr Bateman, of Old Windsor. Upon that I sent Ascioti again to Flanders, who brought me 450 pieces, for which, including the expence of his journey, I paid him 36 guineas. His wife made more journeys for the same purpose; and sold her cargoes to one Palmer, a glazier in St Martin's-lane, who immediately raised the price to one, two, or five guineas for a single piece, and fitted up entire windows with them, and with mosaics of plain glass of different colours. In 1761, Paterfon, an auctioneer at Essex-house in the Strand, exhibited the two first auctions of painted glass, imported in like manner from Flanders. All this manufacture consisted in rounds of scripture-stories, stained in black and yellow, or in small figures of black and white; birds and flowers in colours, and Flemish coats of arms."

The colours used in painting or staining of glass are very different from those used in painting either in water or oil colours.

For black, take scales of iron, one ounce; scales of copper, one ounce; jet, half an ounce: reduce them to powder, and mix them. For blue, take powder of blue, one pound; sal nitre, half a pound; mix them and grind them well together. For carnation, take red chalk, eight ounces; iron scales, and litharge of silver, of each two ounces; gum arabic, half an ounce; dissolve in water; grind all together for half an hour as stiff as you can; then put it in a glass and stir it well, and let it stand to settle fourteen days. For green, take red lead, one pound; scales of copper, one pound; and flint, five pounds: divide them into three parts; and add to them as much sal nitre;

put

put them into a crucible, and melt them with a strong fire; and when it is cold, powder it, and grind it on a porphyry. For gold colour, take silver, an ounce; antimony, half an ounce; melt them in a crucible; then pound the mass to powder, and grind it on a copper plate; add to it yellow ochre, or brick-duft calcined again, fifteen ounces; and grind them well together with water. For purple, take minium, one pound; brown stone, one pound; white flint, five pounds: divide them into three parts, and add to them as much sal nitre as one of the parts; calcine, melt, and grind it as you did the green. For red, take jet, four ounces; litharge of silver, two ounces; red chalk, one ounce; powder them fine, and mix them. For white, take jet, two parts; white flint, ground on a glass very fine, one part; mix them. For yellow, take Spanish brown, ten parts; leaf-silver, one part; antimony, half a part; put all into a crucible, and calcine them well.

In the windows of ancient churches, &c. there are to be seen the most beautiful and vivid colours imaginable, which far exceed any of those used by the moderns, not so much because the secret of making those colours is entirely lost, as that the moderns will not go to the charge of them, nor be at the necessary pains, by reason that this sort of painting is not now so much in esteem as formerly. Those beautiful works which were made in the glass-houses were of two kinds.

In some, the colour was diffused through the whole substance of the glass. In others, which were the more common, the colour was only on one side, scarce penetrating within the substance above one-third of a line; though this was more or less according to the nature of the colour, the yellow being always found to enter the deepest. These last, though not so strong and beautiful as the former, were of more advantage to the workmen, by reason that on the same glass, though already coloured, they could show other kinds of colours where there was occasion to embroider draperies, enrich them with foliages, or represent other ornaments of gold, silver, &c.

In order to this, they made use of emery, grinding or wearing down the surface of the glass till such time as they were got through the colour to the clear glass. This done, they applied the proper colours on the other side of the glass. By these means, the new colours were hindered from running and mixing with the former, when they exposed the glasses to the fire, as will appear hereafter.

When indeed the ornaments were to appear white, the glass was only bared of its colour with emery, without tinging the place with any colour at all; and this was the manner by which they wrought their lights and heightenings on all kinds of colour.

The first thing to be done, in order to paint or stain glass, in the modern way, is to design, and even colour the whole subject on paper. Then they choose such pieces of glass as are clear, even, and smooth, and proper to receive the several parts; and proceed to distribute the design itself, or papers it is drawn on, into pieces suitable to those of the glass; always taking care that the glasses may join in the contours of the figures and the folds of the draperies; that the carnations, and other finer parts, may not be impaired by

the lead with which the pieces are to be joined together. The distribution being made, they mark all the glasses as well as papers, that they may be known again: which done, applying every part of the design upon the glass intended for it, they copy or transfer the design upon this glass with the black colour diluted in gum-water, by tracing and following all the lines and strokes as they appear through the glass with the point of a pencil.

When these strokes are well dried, which will happen in about two days, the work being only in black and white, they give a slight wash over with urine, gum arabic, and a little black; and repeat it several times, according as the shades are desired to be heightened; with this precaution, never to apply a new wash till the former is sufficiently dried.

This done, the lights and risings are given by rubbing off the colour in the respective places with a wooden point, or the handle of the pencil.

As to the other colours above mentioned, they are used with gum-water, much as in painting in miniature; taking care to apply them lightly, for fear of effacing the outlines of the design; or even, for the greater security, to apply them on the other side; especially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard must always be had not to lay colour on colour, or lay on a new lay, till such time as the former are well dried.

It may be added, that the yellow is the only colour that penetrates through the glass, and incorporates therewith by the fire; the rest, and particularly the blue, which is very difficult to use, remaining on the surface, or at least entering very little. When the painting of all the pieces is finished, they are carried to the furnace or oven to anneal or bake the colours.

The furnace here used is small, built of brick, from 18 to 30 inches square. At six inches from the bottom is an aperture to put in the fuel and maintain the fire. Over this aperture is a grate made of three square bars of iron, which traverse the furnace, and divide it into two parts. Two inches above this partition is another little aperture, through which they take out pieces to examine how the coction goes forward. On the grate is placed a square earthen pan, six or seven inches deep, and five or six inches less every way than the perimeter of the furnace. On the one side hereof is a little aperture, through which to make trials, placed directly opposite to that of the furnaces destined for the same end. In this pan are the pieces of glass to be placed in the following manner: First, the bottom of the pan is covered with three strata or layers of quicklime pulverised; those strata being separated by two others of old broken glass, the design whereof is to secure the painted glass from the too intense heat of the fire. This done, the glasses are laid horizontally on the last or uppermost layer of lime.

The first row of glass they cover over with a layer of the same powder an inch deep; and over this they lay another range of glasses, and thus alternately till the pan is quite full; taking care that the whole heap always end with a layer of the lime-powder.

The pan being thus prepared, they cover up the

Glass. furnace with tiles, on a square table of earthen ware, closely luted all round; only leaving five little apertures, one at each corner, and another in the middle, to serve as chimneys. Things thus disposed, there remains nothing but to give the fire to the work. The fire for the first two hours must be very moderate, and must be increased in proportion as the coction advances, for the space of ten or twelve hours; in which time it is usually completed. At last the fire, which at first was charcoal, is to be of dry wood, so that the flame covers the whole pan, and even issues out at the chimneys.

During the last hours, they make essays, from time to time, by taking out pieces laid for the purpose through the little aperture of the furnace and pan, to see whether the yellow be perfect, and the other colours in good order. When the annealing is thought sufficient, they proceed with great haste to extinguish the fire, which otherwise would soon burn the colours, and break the glasses.

Glass-Balls, which are circular or otherwise shaped hollow vessels of glass, may be coloured within, so as to imitate the semipellucid gems. The method of doing it is this: make a strong solution of ichthyocolla, or isinglass, in common water, by boiling; pour a quantity of this while warm into the hollow of a white glass vessel; shake it thoroughly about, that all the sides may be wetted, and then pour off the rest of the moisture. Immediately after this, throw in red-lead, shake it and turn it about, throw it into many places with a tube, and the moisture will make it stick and run in waves and pretty figures. Then throw in some of the painter's blue smalt, and make it run in waves in the ball as the red-lead; then do the same with verdgris, next with orpiment, then with red lake, all well ground; always casting in the colours in different places, and turning the glass, that the moisture within may run them into the waves. Then take fine plaster of Paris, and put a quantity of it into the ball; shake it also nimbly about; this will every where stick firmly to the glass, and give it a strong inner coat, keeping all the colours on very fairly and strongly. These are set on frames of carved wood, and much esteemed as ornaments in many places..

Glass-Drops. See *RUPERT'S drops*.

Engraving on GLASS. See *CHEMISTRY*, n° 2d 857.

Foliating of GLASS. See *FOLIATING and LOOKING-glass*.

Gilding of GLASS. See *GILDING*.

Impressions of antique Gems taken in GLASS. See *GEMS*.

GLASS of Lead, a glass made with the addition of a large quantity of lead, of great use in the art of making counterfeit gems. The method of making it is this: Put a large quantity of lead into a potter's kiln, and keep it in a state of fusion with a moderate fire, till it is calcined to a grey loose powder; then spread it in the kiln, and give it a greater heat, continually stirring it to keep it from running into lumps; continue this several hours, till the powder become of a fair yellow; then take it out, and sift it fine: this is called *calcined lead*. Take of this calcined lead 15 pounds, and crystalline or other frit 12 pounds; mix these as well as possible together; put them into a pot, and set them in the furnace for ten hours; then cast the whole, which will be now perfectly melted, into water; sepa-

rate the loose lead from it, and return the metal into the pot; and after standing in fusion 12 hours more, it will be fit to work. It is very tender and brittle, and must be worked with great care, taking it slowly out of the pot, and continually wetting the marble it is wrought upon.

It is well known that cerufs or white lead, minium, litharge, and all the other preparations and calcēs of lead, are easily fused by a moderate fire, and formed into a transparent glass of a deep yellow colour. But this glass is so penetrating and powerful a flux, that it is necessary to give it a greater consistence, in order to render it fit for use. With this view, two parts of calx of lead, e. g. minium, and one part of sand or powdered flints, may be put into a crucible of refractory clay, and baked into a compact body. Let this crucible, well closed with a luted lid, be placed in a melting furnace, and gradually heated for an hour or an hour and a half; and afterwards let the heat be increased so as to obtain a complete fusion, and continued in that state for the same time: let the crucible remain to cool in the furnace; and when it is broken, a very transparent yellow-coloured glass will be found in it. Some add nitre and common salt to the above mixture, because these salts promote the fusion and the more equal distribution of the sand. This glass of lead has a considerable specific gravity, and its lowest part is always the heaviest. It is an important flux in the assays of ores to facilitate their scorifications.

Glass of lead is capable of all the colours of the gems in very great perfection. The methods of giving them are these: for green, take pulverine frit 20 pounds, lead calcined 16 pounds; sift both the powders very fine; then melt them into a glass, separating the unmixed lead, by plunging the mass in water; after this return it into the pot, and add brass thrice calcined six ounces, and one penny-weight of crocus martis made with vinegar; put this in at six different times, always carefully mixing it together; let it finally settle an hour, then mix it together, and take a proof of it; when the colour is right, let it stand eight hours, and then work it. If instead of the calcined brass the same quantity of the caput mortuum of the vitriolum veneris be used, the green is yet much finer.

For topaz-colour, take crystal frit 15 pounds, calcined lead 12 pounds; mix them well together, by sifting the powders through a fine sieve; then set them in a furnace not too hot, and separate the superfluous unmixed lead, by casting the whole into water; repeat this twice: then add half gold yellow glass, and let them incorporate and purify, and they will be of the true and exact colour of the oriental topazes.

For sea-green, take crystal frit 16 pounds, calcined lead 10 pounds; mix and sift them together, and set them in a pot in a furnace; in 12 hours the whole will be melted; then cast it into water, and separate it from the loose lead; put them into the furnace again for eight hours; then separate the loose lead by washing a second time, and return it to the pot for eight hours more.

Muscovy GLASS. See *MICA*.

Painting on Glass by means of Prints. See *BACK-painting*.

GLASS-Porcelain, the name given by many to a modern invention of imitating the china-ware with glass. The

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The method given by Mr Reaumur, who was the first that carried the attempt to any degree of perfection, is shortly this: The glass-vessels to be converted into porcelain are to be put into a large earthen vessel, such as the common fine earthen dishes are baked in, or into sufficiently large crucibles; the vessels are to be filled with a mixture of fine white sand, and of fine gypsum or plaster-stone burnt into what is called plaster of Paris, and all the interstices are to be filled up with the same powder, so that the glass vessels may no where touch either one another, or the sides of the vessel they are baked in. The vessel is to be then covered down and luted, and the fire does the rest of the work; for this is only to be put into a common potter's furnace, and when it has stood there the usual time of the baking the other vessels, it is to be taken out, and the whole contents will be found no longer glass, but converted into a white opaque substance, which is a very elegant porcelain, and has almost the properties of that of China.

The powder which has served once will do again as well as fresh, and that for a great many times: nay, it seems ever so often. The cause of this transformation, says Macquer, is probably that the vitriolic acid of the gypsum quits its basis of calcareous earth, and unites with the alkaline salt and saline earth of the glass, with which it forms a kind of salt or selenites, different from the calcareous selenites, by the interposition of which matter the glass acquires the qualities of porcelain. See further on this subject the article CHEMISTRY, n° 591—594.

Glass-Pots, the vessels in the glass trade used for melting the glass. Those for the white glass works are made of a tobacco-pipe clay, brought from the Isle of Wight, which is first well washed, then calcined, and afterwards ground to a fine powder in a mill; which being mixt with water, is then trod with the bare feet till it is of a proper consistence to mould with the hands into the proper shape of the vessels. When these are thus made, they are afterwards annealed over the furnace. Those for the green glass work are made of the nonsuch, and another sort of clay from Staffordshire; they make these so large as to hold three or four hundred weight of metal. And besides these, they have a small sort called piling-pots, which they set upon the larger, and which contain a finer and more nice metal fit for the nicest works.

The clay that is used for this purpose should be of the purest and most refractory kind, and well cleansed from all sandy, ferruginous, and pyritous matters; and to this it will be proper to add ground crucibles, white sand, calcined flints duly levigated, or a certain proportion of the same clay baked, and pounded not very finely. The quantity of baked clay that ought to be mixed with the crude clay, to prevent the pots from cracking when dried, or exposed to a great heat, is not absolutely determined, but depends on the quality of the crude clay, which is more or less fat. M. D'Antic, in a memoir on this subject, proposes the following method of ascertaining it: the burnt and crude clay, being mixed in different proportions, should be formed into cakes, one inch thick, and four inches long and wide. Let these cakes be slowly dried, and exposed to a violent heat, till they become as hard and as much contracted as possible, and in this state be examined;

and the cake, he says, which has suffered a diminution of its bulk equal only to an eighteenth part, is made of the best proportions. He observes, in general, that most clays require that the proportion of the burnt should be to the fresh as four to five.

Tin-Glass, the same with Bismuth. See the article BISMUTH; also CHEMISTRY, N° 1250.

Vessels of Glass used in Chemical Experiments. See CHEMISTRY, n° 556.

GLASSES are distinguished, with regard to their form, use, &c. into various kinds, as, drinking-glasses, optical-glasses, looking-glasses, burning-glasses, &c.

Drinking-GLASSES, are simple vessels of common glass or crystal, usually made in form of an inverted cone.

Each glass consists of three parts, viz. the calyx or bowl, the bottom, and the foot; which are all wrought or blown separately.

Nothing can be more dexterous and expeditious than the manner wherein these parts are all blown; two of them opened, and all three joined together. An idea is only to be had thereof, by seeing them actually at work.

The glasses chiefly used in England are made of the ashes of fern; crystal glasses being less frequent in use. The exceeding brittleness of this commodity, notwithstanding the easy rate of each glass, renders the consumption thereof very considerable. For the method of gilding the edges of drinking-glasses, see GILDING on Enamel and Glass.

Optical-GLASSES. See OPTICS.

The improvements hitherto made in telescopes by means of combining lenses made of different kinds of glass, though very great, are yet by no means adequate to the expectations that might reasonably be formed: if opticians could fall on any method of obtaining pieces of glass sufficiently large for pursuing the advantages of Mr Dollond's discovery. Unfortunately, however, though the board of longitude have offered a considerable reward for bringing this art to the requisite perfection, no attempt of any consequence has hitherto been made. Mr Keir is of opinion, that the accomplishment of this is by no means an easy task; as it requires not only a competent knowledge of the properties of glass fittest for the purpose (the faults not being evident to common inspection), but a considerable degree of chemical knowledge is also necessary in order to invent a composition by which these faults may be avoided; and lastly, a kind of dexterity in the execution of the work, which can only be acquired by practice. Our author, however, thinks, that if the subject were more generally understood, and the difficulties more fully pointed out, for which purpose he makes the following remarks, the end might be more easily accomplished.

1. The rays of light passing through a glass lens or prism, or through any other medium of unequal thickness, are refracted; but not in an equal manner, the blue, violet, &c. being more refracted than the red.

2. Hence it happens, that the rays of light, when refracted by a common lens, do not all unite in one focus, but in reality form as many different foci as there are colours; and hence arise the prismatic colours, or irises, which appear towards the borders of the image formed by the common convex lenses, and which render the vision extremely indistinct.

3. The indistinctness of vision produced by this cause, which

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which is sensible in telescopes of a small aperture, increases in so great a proportion, viz. as the cubes of the diameters, that it seemed impossible to increase the power of dioptric telescopes greatly, without extending them to a very inconvenient length, unless this confusion of colours could be corrected.

4. It was known that different transparent bodies possessed different degrees of refractive power; and, until Mr Dollond discovered the contrary, it was supposed, that the refractions of the coloured rays were always in a determinate ratio to one another. On this supposition it seemed impossible to correct the faults of refracting telescopes: for it was supposed, that if the dispersion of light produced by a convex lens were counteracted by another lens or medium of a concave form, the refraction would be totally destroyed; and this indeed would be the case, if the two mediums were made of the same matter; and from some experiments made by Sir Isaac Newton, this was supposed to be actually the case in all substances whatever.

5. From considering that the eyes of animals are formed of mediums of different colours, it occurred first to Mr David Gregory, the celebrated professor of astronomy at Oxford, and then to Mr Euler, that, by a combination of mediums which had different refractive powers, it might be possible to remedy the imperfections of dioptric telescopes. It does not, however, appear, that either of these gentlemen understood the true principle on which these phenomena depend. Mr Euler executed his idea by forming a compound object lens from two glass lenses with water interposed, but his attempt was not attended with success. Mr Dollond, however, was led by some arguments adduced by Mr Klingesternia, to repeat one of Sir Isaac Newton's experiments, and which had induced even that great philosopher himself to suppose that the improvement afterwards executed by Mr Dollond was impossible. This experiment was made by Sir Isaac Newton, by placing a glass prism within a prismatic vessel filled with water, in such a manner that the rays of light which were refracted by the glass prism should pass through and be refracted in a contrary direction by the water prism. In this manner the refraction of the light was entirely destroyed. But when Mr Dollond repeated the experiment, he found, that, contrary to his own expectations, when the angles of the two prisms were so proportioned that they counteracted each other's mean refraction, then colours appeared; and on the other hand, when they were so proportioned that the dispersion of the coloured rays was counteracted, the mean refraction still subsisted; which evidently proved, that the mean refractive and dispersive powers of glass and water were not proportional to one another.

6. To apply this to the proposed improvement, Mr Dollond examined several kinds of glass. Crown-glass was found to possess the smallest dispersive power in proportion to its refraction; while flint-glass possessed the greatest dispersive power in proportion to its refraction, which was also very great. On comparing these two exactly together, he found, that a wedge of white flint glass whose angle was about 25 degrees, and another of crown-glass whose angle was 29 degrees, refracted very nearly alike. He found also, that, when the wedges were ground to such angles, the refraction produced by the flint-glass was to that produced

by the crown-glass nearly as two to three, the refracted light was then free from colour. On measuring the general refracting powers of these two glasses, he found, that in flint-glass, the sine of incidence of the rays was to the sine of mean refraction as 1 to 1.583; and that, in crown-glass, the sine of incidence was to the sine of mean refraction as 1 to 1.53.

The methods of determining the different refractive powers of glass are given under the article OPTICS. Here we shall only observe, that two kinds of glass are necessary for the construction of achromatic telescopes; one of which shall possess as small, and the other as great, dispersive powers, relative to their mean refracting powers, as can be procured. The difference of glasses in this respect depends on the quality of the ingredients employed in their composition. Crown-glass, which is composed of sand melted by means of the ashes of sea-weeds, barilla, or kelp, both which fluxes are known to consist of vegetable earth, alkali, and neutral salt, is found to give the smallest dispersive power. Plate glass, which consists of sand melted by means of fixed vegetable alkali, with little or no vegetable earth, gives a greater dispersive power; but both these give much less than flint glass, which consists of sand melted by means of minium and fixed alkali. It appears, therefore, that the dispersion of the rays is greatest when minium, or probably other metallic calces, are made use of; and that alkalies give a greater power of dispersion than vegetable or other earths. Mr Zieher of Peterburgh, however, informs us that he has made a kind of glass, much superior in this respect to flint glass; but it does not as yet appear whether it be more fit for optical purposes, than that commonly made use of. There seems no difficulty in augmenting the dispersive power, as that is found to depend on the quantity of minium or other flux: but thus we unfortunately increase also the capital fault to which flint glass and all compositions of that kind are subject; namely, the being subject to veins or small threads running through it. By these, even when so small as to be imperceptible to the naked eye, the rays, which fall on them are diverted from their proper direction, and thereby render the images confused. This is owing to the greater density of the veins, as appears by their image being received on white paper, when the glass is held between the paper and the sun or a candle, at a proper distance. The rays of light being then made to converge by the superior density of the veins, their images will appear as bright lines bordered with obscure edges on the paper. Flint-glass is so much subject to this kind of imperfection, that it is with difficulty the opticians can pick out pieces of the size commonly used from a large quantity of the glass. It is farther to be regretted, that the minium which produces the greatest dispersive power, is likewise the very substance which renders flint-glass much more subject to these imperfections than any other. The reason is, that the sand and earthy matters mix uniformly in fusion; and, having not only a considerable degree of affinity towards each other, but also being not much different from each other, they are not apt to separate. On the other hand, when such an heavy substance as minium is added to these earthy substances, though it has a pretty strong tendency to unite with the earthy substances, it has none with the fixed alkali, which

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is another ingredient in this glass. Hence some parts of the glass will contain more metallic matter than the rest; particularly that near the bottom of the pot, which is so full of large veins as to be applied only to the making of wares of little value. The veins in this case are formed by the descent of the minium to the bottom, which in its passage forms threads or veins by dragging other parts of the glass along with them.

The correction of this fault appears therefore to be very difficult. M. Macquer informs us, that he had in vain tried to remove it by very long fusion and a fierce fire; which indeed others have found by experience not to correct, but to augment the evil. Mr Keir is of opinion that some new composition must be discovered, which, along with a sufficient refractive power, should possess a greater uniformity of texture; but he is likewise of opinion, that scarce any alteration in this respect could be made without injuring the colour of the glass. For optical purposes, however, our author does not think that an alteration in the colour of the ingredients would be very detrimental. "I am convinced," (says he), "that glasses sensibly tinged with colour, might transmit as much or more light than the best flint-glass. For the colourless appearance of flint-glass is an optical deception. The minium gives it a considerable tinge of yellow, and the alkali inclines it to a bluish cast, besides the colour arising from a greater or less impurity of the materials; so that the glass would actually be very sensibly coloured, unless by the addition of manganese, which is known to give a purplish red. Thus the other tinges are counteracted, but not effaced or destroyed as has been frequently imagined. By the mixture of the three principal colours, red, yellow, and blue, more or less exactly counterpoised, a certain dark shade is introduced, in which, as not any one of the colours predominates, no coloured tinge appears, but the effect is merely a diminution of the transparency of the glass, which, however, is too small for ordinary observation." Mr Keir is even of opinion, that a certain tinge of yellow would in many cases be of service, because it would exclude some of the blue rays, which being most refrangible are most injurious to the distinctness of vision.

Very considerable difficulties, however, must arise in attempting improvements of this kind; as the experiments must all be tried on a very large scale. This is not only attended with a very heavy expence in itself on account of the quantity of materials employed, but from the heavy duty of excise which is rigorously exacted whether the glass be manufactured into saleable articles or not. It is observed in the manufacture of every kind of glass, that the glass in the middle of the area or transverse section of a pot is much purer and freer from veins and other imperfections than the part which is near the sides, and that the glass at the bottom is the worst of all. Consequently it is chiefly in large pots, such as are used in manufactures, that there is a probability of success. Very fine and beautiful glasses, called *paste* and *artificial gems*, may be made in smaller pots or crucibles; but this glass is suffered to cool and subside in the vessel, by which means the contiguous parts are more uniform in their texture than can be expected in a piece of glass taken out of the pot while hot in the common way, by making it adhere and twist round an iron rod or pipe. But although

the method of allowing the glass to cool in the pots is very advantageous for the purposes of the jeweller, it is by no means applicable to those of the optician. Glass cooled in that gradual manner, suffers some degree of crystallization or peculiar arrangement of its parts; the consequence of which is, that the rays of light undergo certain refractions independent on the form of the glass, which greatly affect the distinctness of vision in telescopes.

Musical GLASSES. See HARMONICA.

Looking GLASS. See *LOOKING GLASS*, MIRROR, and FOLIATING.

Burning GLASS. See *BURNING GLASS*.

Weather GLASS. See BAROMETER.

Cupping GLASS. See SURGERY.

Hour GLASS. See *Hour Glass*.

Watch GLASS. See WATCH.

GLASS-Wort. See SALSOLA.

GLASTONBURY, a town of Somersetshire in England; seated in W. Long. 2. 46. N. Lat. 51. 15.—It is noted for a famous abbey, some magnificent ruins of which are still remaining; but they are every day diminishing for the sake of the stones. However, the curious structure called *the Abbot's kitchen* is still pretty entire, and is of a very unusual contrivance. The monks pretend that it was the residence of Joseph of Arimathea, and of St Patrick; but for this assertion they produce no good authority. The king of the West Saxons erected a church here, which he and the succeeding kings enriched to such a degree, that the abbot lived like a prince, had the title of *lord*, and sat among the barons in parliament; and no person, not even a bishop or prince, durst set foot on the isle of Avalon, in which the abbey stands, without his leave. The revenue of the abbey was above 40,000*l.* *per ann.* besides seven parks well stocked with deer. The last abbot (Richard Whiting), who had 100 monks, and 300 domestics, was hanged in his pontificals, with two of his monks, on the Tor, a high hill in the neighbourhood, for refusing to take the oath of supremacy to Henry VIII. and surrender his abbey when required. Edgar and many other Saxon kings were buried here; and, as some will have it, Arthur the British king. Every cottage here has part of a pillar, a door, or a window of this fabric; of which there still remain the ruins of the choir, the middle tower, and chapels. The walls that remain of the abbey are overgrown with ivy, and the aspect of the whole is both melancholy and venerable. Here are two parish churches. This town, while under the protection of its abbots, was a parliamentary borough, but it lost that and its privilege of a corporation; the latter of which was, however, restored by queen Anne, who granted it a new charter for a mayor and burghesses. The only manufactory here is stockings, but the chief support of the place is the resort of people to see the ruins of the abbey. The George Inn here was formerly called *the Abbot's Inn*; because it was a receptacle for the strollers that came in pilgrimage to the abbey. At a little distance from the old church and facing the monk's church-yard are two remarkable pyramids, with inscriptions, that are in characters unintelligible, and an image in bishops vestments.—The story of the Glastonbury thorn, and of its budding always upon Christmas-day, is well known: however, that circumstance is false; though if the winter

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ter is mild, it always buds about the latter end of December, but later if the weather is severe.

GLATZ, a handsome and strong town of Bohemia, and capital of a county of the same name. It is seated on the river Neisse; and has strong fortifications, with a castle built upon a mountain. The county was ceded to the king of Prussia by the queen of Hungary in 1742; and is about 45 miles in length, and 25 in breadth. It has mines of pit-coal, silver, and iron; good quarries, plenty of cattle, and fine springs of mineral water. The town is situated in E. Long. 15. 16. N. Lat. 50. 25.

GLAUBER (John Rhodolphus), a celebrated German chemist, who flourished about the year 1646. He wrote a great number of different treatises on chemistry, some of which have been translated into Latin and French. All his works have been collected into one volume, intitled, *Glauberus concentratus*, which has been translated into English, and was printed at London, in folio, in 1689.

GLAUBER'S Salts. See CHEMISTRY Index.

GLAUCOMA, in medicine and surgery, the name of a disease in the eye, wherein the crystalline humour is turned of a bluish or greenish colour, and its transparency hereby diminished.—The word comes from γλαυκος, *caesus*, “sea green, sky-coloured, or greyish.”

Those in whom this disorder is forming, discover it hence, that all objects appear to them as thro’ a cloud or mist; when entirely formed, the visual rays are all intercepted, and nothing is seen at all.

It is reckoned incurable, when inveterate, and in aged persons: and even under other circumstances, is very difficult of cure, externals proving of little service.

The internals best suited to it, are those used in the gutta serena. Jul. Cæsar Claudinus, Consul. 74. gives a remedy for the glaucoma.

The glaucoma is usually distinguished from the cataract or suffusion, in this, that in the cataract the whiteness appears in the pupil, very near the cornea; but it shows deeper in the glaucoma.

Some late French authors, however, maintain the cataract and glaucoma to be one and the same disease. According to them, the cataract is not a film, or pellicle, formed before the pupil, as had always been imagined; but an inspissation or induration of the humour itself, whereby its transparency is prevented; which brings the cataract to the glaucoma. According to Mr Sharp, the glaucoma of the ancient Greeks is the present cataract; but M. St Yves says it is a cataract accompanied with a gutta serena. See SURGERY.

GLAUCUS, a marine god, or deity of the sea. There are a great many fabulous accounts of this divinity: but the poetical history of him is, that before his deification, he was a fisherman of the town of Anthedon, who having one day taken a considerable number of fishes, which he laid upon the bank, on a sudden perceived, that these fishes, having touched a kind of herb that grew on the shore, received new strength, and leaped again into the sea; upon the sight of which extraordinary accident, he was tempted to taste of the herb himself, and presently leaped into the sea after them, where he was metamorphosed into a Triton, and became one of the sea-gods.

GLAUX, in botany: A genus of the monogynia N° 140.

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order, belonging to the pentandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is monophyllous; there is no corolla: the capsule is unilocular, quinquevalved, and pentaspermous.

GLAZIER, an artificer who works in glass.—The principal part of a glazier’s business consists in fitting panes of glass to the sashes and window-frames of houses, pictures, &c. and in cleaning the same.

GLAZING, the crusting over earthen ware by a vitreous substance, the basis of which is lead. See GLASS of Lead.

The workers of common earthen ware, however, are not at the trouble of thus previously making a pure glass of lead. Their usual composition for glazing their ware is formed of white sand 40 pounds, of red lead 20 pounds, of pearl-ashes 20 pounds, and of common salt 12 pounds. Powder the sand by grinding it, and then add it to the other ingredients and grind them together: after which calcine them for some time with a moderate heat, and when the mixture is cold, pound it to powder; and when wanted for use temper it with water. The proportion of these ingredients may be occasionally varied. The ware, after being turned on the wheel and dried in the open air, is covered over with the above composition by means of a brush; and when set in the furnace the violent heat soon reduces it to a perfect glass, covering the whole internal and external surface of the vessel.

We may observe, however, in general, that lead ought to be excluded from the composition of glazings, and other fluxes substituted in its stead. A transparent glazing may be prepared without lead by calcining 40 pounds of white sand, 25 pounds of pearl-ashes, and 15 pounds of common salt; and proceeding as before: and a more perfect transparent glazing may be made of sand 40 pounds, of wood-ashes perfectly burnt 50 pounds, of pearl-ashes 10 pounds, and of common salt 12 pounds. The following recipes are taken for the most part from Kunckel, who says, that they are the true glazings used at Delft and other Dutch manufactories.

Black is made of eight parts of red-lead, iron-filings three, copper-ashes three, and zaffer two measures. This when melted will make a brown-black; and if you want it blacker, add more zaffer to it.

Blue is thus prepared: Take lead-ashes or red-lead one pound, clear-sand or powdered flints two pounds, common salt two pounds, white calcined tartar one pound, Venice or other glass half a pound, zaffer half a pound; mix them well together and melt them for several times, quenching them always in cold water. If you would have it fine and good, it will be proper to put the mixture into a glass furnace for a day or two.

Another blue glazing may be formed of one pound of tartar, a quarter of a pound of red-lead, half an ounce of zaffer, and a quarter of a pound of powdered flints, which are to be fused and managed as in the last recipe. Or, take two pounds of calcined lead and tin, add five pounds of common salt, five pounds of powdered flints, and of zaffer, tartar, and Venetian glass, each one pound. Calcine and fuse the mixture as before. Or, again, take of red-lead one part, of sand three parts, and of zaffer one part. For a violet blue

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glazing, take four ounces of tartar, two ounces of red-lead, five ounces of powdered flints, and half a dram of manganese.

Brown is made of red-lead and flints of each 14 parts, and of manganese two parts fused; or of red-lead 12 parts, and manganese one part fused. A brown glazing, to be laid on a white ground, may be made of manganese two parts, and of red-lead and white-glass of each one part, twice fused.

Flesh-coloured is made of 12 parts of lead ashes, and one of white-glass.

Gold-coloured. Take of litharge three parts, of sand or calcined flint one part; pound and mix these very well together, then run them into a yellow glass with a strong fire. Pound this glass, and grind it into a subtile powder; which moisten with a well saturated solution of silver; make it into a paste, which put into a crucible, and cover it with a cover. Give at first a gentle degree of fire; then increase it, and continue it till you have a glass, which will be green. Pound this glass again, and grind it to a fine powder; moisten this powder with some beer, so that by means of an hair pencil you may apply it upon the vessels or any piece of earthen ware. The vessels that are painted or covered over with this glazing must be first well heated, then put under a muffle; and as soon as the glass runs, you must smother them, by holding them over burning vegetables; and take out the vessels. Mr Heinſius of Petersburgh, who sent this receipt to the Royal Society, uses the words *afflare debet fumum*, which is rendered *smother them*, in the Transactions. Phil. Trans. N. 465. § 6.

Kunckel gives several preparations for a gold-coloured yellow glazing. This may be produced by fusing a mixture of three parts of red-lead, two parts of antimony, and one part of saffron of Mars; by again melting the powdered mass, and repeating the operation four times, or by fusing four or five times a composition of red-lead and antimony of each an ounce, and of scales of iron half an ounce; or by calcining and fusing together eight parts of red-lead, six parts of flints, one part of yellow ochre, one part of antimony, and one part of white glass. A transparent gold-coloured glazing may be obtained by twice fusing red-lead and white-flints, of each 12 parts, and of filings of iron one part.

Green may be prepared of eight parts of litharge or red-lead, eight parts of Venice glass, four parts of brass-dust or filings of copper; or of ten parts of litharge, twelve of flint or pebble, and one of *as ustum* or copper-ashes.—A fine green glazing may be produced by fusing one part of the Bohemian granate, one part of filings of copper, one part of red-lead, and one part of Venetian glass; or by fusing one part of white glass, the same quantity of red-lead, and also of filings of copper; powdering the mass, and adding one part of Bohemian granate to two parts of this powder. A fine green may be obtained by mixing and grinding together any of the yellow glazings with equal quantities of the blue glazings; and all the shades and tints of green will be had by varying the proportion of the one to the other, and by the choice of the kind of yellow and blue.

Sea-green is made of five pounds of lead-ashes, one pound of tin-ashes, three pounds of flint, three quar-

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ters of a pound of salt, half a pound of tartar, and half a pound of copper-dust.

Iron-colour is prepared of 15 parts of lead-ashes or red-lead, 14 of white-sand or flints, and five of calcined copper. This mixture is to be calcined and fused.

Liver-colour is prepared of 12 parts of litharge, eight of salt, six of pebble or flint, and one of manganese.

Purple-brown consists of lead-ashes 15 parts, clean sand or powdered flints 18 parts, manganese one part, and white glass 15 measures, to which some add one measure of saffron.

Red is made of antimony three pounds, litharge or red-lead three, and rust of iron one; grind them to a fine powder. Or, take two pounds of antimony, three of red-lead, and one of calcined saffron of Mars, and proceed as before.

White. The white glazing for common ware is made of 40 pounds of clear sand, 75 pounds of litharge or lead-ashes, 26 of pot-ashes, and 10 pounds of salt: these are three times melted into a cake, quenching it each time in clear cold water. Or it may be made of 50 pounds of clean sand, 70 of lead-ashes, 30 of wood-ashes, and 12 of salt.

For a fine white: Take two pounds of lead and one of tin; calcine them to ashes: of this take two parts, calcined flint, white sand, or broken white glass, one part, and salt one part; mix them well together and melt them into a cake for use. The trouble of calcining the tin and lead may be prevented by procuring them in a proper state.

A very fine white glazing may be obtained by calcining two parts of lead and one part of tin; and taking one part of this mass, and of flints and common salt of each one part, and fusing the mixture.

A white glazing may be also prepared by mixing 100 pounds of masticot, 60 pounds of red-lead, 20 pounds of calcined tin or putty, and 10 pounds of common salt, and calcining and powdering the mixture several times.

Yellow is prepared of red-lead three pounds; calcined antimony and tin of each two pounds; or, according to some, of equal quantities of the three ingredients. These must be melted into a cake, then ground fine; and this operation repeated several times: or it may be made of 15 parts of lead-ore, three parts of litharge of silver, and 15 parts of sand.—A fine yellow glazing may be procured by mixing five parts of red-lead, two parts of powdered brick, one part of sand, one part of the white glazings, and two parts of antimony, calcining the mixture and then fusing it. Or, take four parts of white-glass, one part of antimony, three parts of red-lead, and one part of iron-scales, and fuse the mixture; or fuse 16 parts of flints, one part of iron-filings, and 24 parts of litharge. A light yellow glazing may be produced with ten parts of red-lead, three parts of antimony, and three of glass, and two parts of calcined tin. See *Gold-colour*, above.—A *citron yellow* is made of six parts of red-lead, seven parts of fine red brick-dust, and two parts of antimony. This mixture must be calcined day and night for the space of four days, in the ash-hole of a glass-house furnace, and at last urged to fusion.

For the glazing of Delft-ware, Porcelain, Stone-ware,

Glead
||
Gleditsia.

ware, &c. see the articles *DELT-Ware*, *PORCELAIN*, and *POTTERY*.

The Romans had a method of glazing their earthen vessels, which in many respects appears to have been superior to ours. The common brown glazing easily scales off, cracks, and in a short time becomes disagreeable to the eye. Besides, it is very easily destroyed by acids; nor can vessels glazed in this manner be even employed to hold water, without part of it oozing through their pores. Lead is also very destructive to the human body; and if acids are unwarily put into vessels glazed with lead, the liquors will receive a very dangerous impregnation from the metal. The Roman glazing, which is yet to be seen upon urns dug up in several places, appears to have been made of some kind of varnish; and Pliny gives us a hint that it was made of bitumen. He tells us that it never lost its beauty, and that at length it became customary to glaze our statues in this manner. As this varnish sunk deep into the substance of the ware, it was not subject to those cracks and flaws which disfigure our vessels; and as it was not liable to be corroded by acids, it could not be subject to any of the accidents which may ensue from the use of vessels glazed with lead.

GLEAD, or GLADE, a name used in the northern parts of the kingdom for the kite. See *FALCO*.

GLEAM is popularly used for a ray or beam of light. Among falconers a hawk is said to gleam when she casts or throws up filth from the gorge.

GLEANNING, the act of gathering or picking up the ears of corn left behind after the field has been reaped and the crop carried home. By the customs of some countries, particularly those of Melun and Estampes, all farmers and others are forbid, either by themselves or servants, to put any cattle into the fields, or prevent the gleanning in any manner whatever for the space of 24 hours after the carrying off the corn, under penalty of confiscation.

GLEBE, among miners, signifies a piece of earth in which is contained some mineral ore.

GLEBE, in law, the land belonging to a parish-church besides the tithes.

GLECHOMA, *GROUND-IVY*: A genus of the gymnospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 42d order, *Verticillata*. Each pair of the antheræ come together in the form of a cross; the calyx is quinquefid. There are three species; the most remarkable of which is the *hederacea*, or common ground-ivy, which is so well known that it requires no description. Many virtues were formerly attributed to this plant, which it is now found not to be possessed of. Some, however, it has. The leaves are thrown into the vat with ale to clarify it and give it a flavour. Ale thus prepared is often drank as an antiscorbutic. The expressed juice mixed with a little wine, and applied morning and evening, destroys the white specks upon horses' eyes. The plants that grow near it do not flourish. It is said to be hurtful to horses if they eat much of it. Sheep eat it, horses are not fond of it; cows, goats, and swine, refuse it.

GLEDITSIA, *TRIPLE-THORNED ACACIA*, or *Honey-locust*: A genus of the diœcia order, belonging to the polygamia class of plants; and in the natural

method ranking under the 33d order, *Lomentaceæ*. The hermaphrodite calyx is quadrifid; the corolla tetrapetalous; the stamina six, one pistil and legumen. The male calyx is triphyllous; the corolla tripetalous, with six stamina. The female calyx is pentaphyllous; the corolla pentapetalous; one pistil and legumen. There are two species.

1. The *triacanthos*, a native of Virginia and Pennsylvania, is of an upright growth, and its trunk is guarded by thorns of three or four inches in length in a remarkable manner. These thorns have also others coming out of their sides at nearly right angles: Their colour is red. The branches are smooth, and of a white colour. These are likewise armed with red thorns, that are proportionally smaller: they are of several directions, and at the ends of the branches often stand single. The young shoots of the preceding summer are perfectly smooth, of a reddish green, and retain their leaves often until the middle of November. Although there is a peculiar oddity in the nature and position of the spines, yet the leaves constitute the greatest beauty of these trees: they are doubly pinnated, and of a delightful shining green. The pinnated leaves, that form the duplication, do not always stand opposite by pairs on the middle rib; the pinnæ of which they are composed are small and numerous; no less than 10 or 11 pair belong to each of them; and as no less than four or five pair of small leaves are arranged along the middle rib, the whole compound leaf consists often of more than 200 pinnæ of this fine green colour: They sit close, and spread open in fine weather; though during bad weather they will droop, and their upper surfaces nearly join, as if in a sleeping state. The flowers are produced from the sides of the young branches in July: They are a greenish catkin, and make little show; though many are succeeded by pods, that have a wonderful effect; for these are exceedingly large, more than a foot, sometimes a foot and a half in length, and two inches in breadth, and of a nut-brown colour when ripe; so that the effect they occasion, when hanging on the sides of the branches, may easily be guessed.—There is a variety of this species, with fewer thorns, smaller leaves, and oval pods. It has nearly the resemblance of the other; though the thorns being not so frequent, and the pods being smaller, each containing only one seed, this sort loses that singular effect which the other produces by them.

These trees are easily propagated. We receive the seeds from America in the spring, which keep well in the pods, and are for the most part good. They generally arrive in February; and, as soon as possible after, they should be sown in a well-sheltered warm border of light sandy earth. If no border is to be found that is naturally so, it may be improved by applying drift sand, and making it fine. The seeds should be sown about half an inch deep; and they will for the most part come up the first spring. If the summer should prove dry, they must be constantly watered; and if shade could be afforded them in the heat of the day, they would make stronger plants by the autumn. A careful attention to this article is peculiarly requisite; for as the ends of the branches are often killed, if the young plant has not made some progress, it will be liable to be wholly destroyed by the

Gleet,
Glenda-
lagh.

the winter's frost, without protection: And this renders the sowing the seeds in a warm border, under an hedge, in a well-sheltered place necessary; for there these shrubs will endure our winters, even when seedlings, and so will require no farther trouble; nay, though the tops should be nipped, they will shoot out again lower, and will soon overcome it. It will be proper to let them remain two years in the seed-bed before they are planted out in the nursery. The spring is the best time for the work. Their distances should be one foot by two; the rows should be dug between every winter; and, being weeded in summer, here they may remain, with no other particular care, until they are set out to remain. These trees are late in the spring before they exhibit their leaves, but keep shooting long in the autumn.

2. The other species is the inermis, the stem of which is unarmed or without thorns. It is a native of South America, and in this country requires to be kept in a stove.

GLEET, in medicine, the flux of a thin limpid humour from the urethra. See the Index subjoined to MEDICINE.

GLENDALAGH, otherwise called *the Seven Churches*, anciently a celebrated town of Ireland, situated five miles north west of Rothdrum, in the county of Wicklow, and province of Leinster. The name signifies "the valley of the two lakes." In this valley, surrounded by high and almost inaccessible mountains, St Kevin or Cavan, called also *St Coemgene*, about the middle of the 6th century, founded a monastery, which in a short time from the sanctity of its founder was much resorted to, and at length became a bishoprick and a religious city. St Kevin died 3d June 618, aged 120; and on that day annually numbers of persons flock to the Seven Churches to celebrate the festival of that venerated saint. During the middle ages the city of Glendalagh, called by Hovedon *Episcopatus Bislagniensis*, was held in great esteem, and received several valuable donations and privileges, its episcopal jurisdiction extending to the walls of Dublin.—About the middle of the 12th century, on some account or other, it was much neglected by the clergy; and became, instead of a holy city, a den of thieves, wherefore Cardinal Papiro, in 1214, united it to the see of Dublin, which union was confirmed by king John. The O'Tools, chiefs of Firthuathal, however, by the assistance of the Pope, continued long after this period to elect bishops and abbots to Glendalagh, though they had neither revenues or authority, beyond the district of Tuathal, which was the western part of the county of Wicklow; in consequence of which the city was suffered to decay, and had become nearly a desert, in 1497, when Dennis White, the last titular bishop, surrendered his right in the cathedral church of St Patrick, Dublin. From the ruins of this ancient city still remaining, it appears to have been a place of consequence, and to have contained seven churches and religious houses; small indeed, but built in a neat elegant style, in imitation of the Greek architecture: the cathedral, the walls of which are yet standing, was dedicated to St Peter and St Paul. South of the cathedral stands a small church roofed with stone, nearly entire; and in several parts

of the valley are a number of stone crosses, some of which are curiously carved, but without any inscriptions. In the north-west corner of the cemetery belonging to the cathedral stands a round tower, 95 feet high, and 15 in diameter; and in the cemetery of a small church, on the south side of the river, near the great lake, called the *Rhefeart church*, are some tombs, with Irish inscriptions, belonging to the O'Tools. In a perpendicular projecting rock on the south side of the great lake, 30 yards above the surface of the water, is the celebrated bed of St Kevin, hewn out of the rock, exceedingly difficult of access and terrible in prospect. Amongst the ruins have been discovered a number of stones, curiously carved, and containing inscriptions in the Latin, Greek, and Irish languages. As this city was in a valley, surrounded on all sides, except the east, by high, barren, and inaccessible mountains, the artificial roads leading there-to are by no means the least curious part of the remains; the principal is that leading into the county of Kildare through Glendafon. This road for near two miles is yet perfect, composed of stones placed on their edges, making a firm and durable pavement, about 10 feet broad. At a small distance from St Kevin's bed, on the same side of the mountain, are to be seen the ruins of a small stone building called *Saint Kevin's cell*.

GLENOIDES, the name of two cavities, or small depressions, in the inferior part of the first vertebra of the neck.

GLICAS, or GLYCAS, (Michael), a Greek historian about the middle of the 15th century, lived in Sicily, and wrote Annals of what passed from the creation of the world to the death of Alexis Comnenus, in 1118. Leunclavius added to it a fifth part, which carries it down to the taking of Constantinople. Glidas was also the author of several useful and curious letters.

GLIMMER, or GLIST. See MICA.

GLINUS, in botany: A genus of the pentagynia order, belonging to the decandria class of plants; and in the natural method ranking under the 22d class, *Caryophyllei*. The calyx is pentaphyllous; there is no corolla; the nectarium is composed of bifid bristles; the capsule is quinqueangular, quinquelocular, quinquevalved. and polyspermous.

GLIRES, the name of Linnæus's fourth order of mammalia. See ZOOLOGY.

GLISSON (Francis), a learned English physician in the 17th century, was educated at Cambridge, and was made regius professor of that university. In 1634 he was admitted a fellow of the college of physicians in London. During the civil wars, he practised physic at Colchester, and afterwards settled in London. He greatly improved physic by his anatomical dissections and observations, and made several new discoveries of singular use towards establishing a rational practice. He wrote, 1. *De rachitide*, &c. 2. *De lymphaductis nuper repertis*; with the *Anatomica prolegomena*, & *Anatomia hepatis*. 3. *De natura substantia energetica*; seu *de via vite naturæ, ejusque tribus primis facultatibus*, &c. quarto, 4. *Traſſatus de ventriculo & intestinis*, &c. The world is obliged to him for the *capsula communis*, or *vagina portæ*.

Glenoides
||
Gliffon.

Glister
||
Globe.

GLISTER, in surgery. See CLYSTER.

GLOBBA, in botany: A genus of the monogynia order, belonging to the monandria class of plants. The corolla is equal and trifid; the calyx trifid above; the capsule trilobular, with many seeds.

GLOBE, in geometry, a round or spherical body more usually called a *sphere*. See SPHERE.

GLOBE, is more particularly used for an artificial sphere of metal, plaster, paper, or other matter; on whose convex surface is drawn a map, or representation either of the earth or heavens, with the several circles conceived thereon. See GEOGRAPHY.

Globes are of two kinds, *terrestrial* and *celestial*; each of very considerable use, the one in astronomy, and the other in geography, for performing many of the operations thereof in an easy obvious manner, so as to be conceived without any knowledge of the mathematical grounds of those arts.

The fundamental parts, common to both globes, are an axis, representing that of the world; and a spherical shell, or cover, which makes the body of the globe, on the external surface of which the representation is drawn. See AXIS, POLE, &c.

Globes, we have observed, are made of different materials, viz. silver, brass, paper, plaster, &c. Those commonly used are of plaster and paper: The construction whereof is as follows:

Construction of GLOBES.—A wooden axis is provided, somewhat less than the intended diameter of the globe; and into the extremes hereof two iron wires are driven for poles: this axis is to be the beam, or basis of the whole structure.

On the axis are applied two spherical or rather hemispherical caps, formed on a kind of wooden mould or block.—These caps consist of pasteboard, or paper, laid one lay after another, on the mould, to the thickness of a crown-piece; after which, having stood to dry and embody, making an incision along the middle, the two caps thus parted are slipped off the mould.

They remain now to be applied on the poles of the axis, as before they were on those of the mould: and to fix them in their new place, the two edges are sewed together with pack-thread, &c.

The rudiments of the globe thus laid, they proceed to strengthen and make it smooth and regular. In order to this, the two poles are hasped in a metalline semicircle of the size intended; and a kind of plaster, made of whiting, water, and glue, heated, melted, and incorporated together, is daubed all over the paper-surface. In proportion as the plaster is applied, the ball is turned round in the semicircle, the edge whereof pares off whatever is superfluous and beyond the due dimension, leaving the rest adhering in places that are short of it. After such application of plaster, the ball stands to dry; which done, it is put again in the semicircle, and fresh matter applied: thus they continue alternately to apply the composition, and dry it, till such time as the ball every where accurately touches the semicircle; in which state it is perfectly smooth, regular, firm, &c.

The ball thus finished, it remains to paste the map or description thereon: in order to this, the map is projected in several gores, or gussets; all which join accurately on the spherical surface, and cover the

whole ball. To direct the application of these gores, lines are drawn by a semicircle on the surface of the ball, dividing it into a number of equal parts corresponding to those of the gores, and subdividing those again answerably to the lines and divisions of the gores.

The papers thus pasted on, there remains nothing but to colour and illuminate the globe; and to varnish it, the better to resist dust, moisture, &c.—The globe itself thus finished, they hang it in a brass meridian, with an hour-circle, and a quadrant of altitude; and thus fit it into a wood horizon.

To describe the gores, or gussets, for the globes. In Chambers's Dictionary, the following method is directed.

“1. From the given diameter of the globe, find a Plate right line AB, fig. 1. equal to the circumference of a great circle, and divide it into twelve equal parts.

2. Through the several points of division, 1, 2, 3, 4, &c. with the interval of ten of them, describe arches mutually intersecting each other in D and E; these figures or pieces duly pasted or joined together will make the whole surface of the globe.

3. Divide each part of the right line AB into 30 equal parts, so that the whole line AB, representing the periphery of the equator, may be divided into 360 degrees.

4. From the poles D and E, fig. 2. with the interval of $23\frac{1}{2}$ deg. describe arches *a b*; these will be twelfth-parts of the polar circles.

5. After the like manner, from the same poles D and E, with the interval of $66\frac{1}{2}$ deg. reckoned from the equator, describe arches *c d*; these will be twelfth-parts of the tropics.

6. Through the degree of the equator *e*, corresponding to the right ascension of any given star, and the poles D and E, draw an arch of a circle; and taking in the compasses the complement of the declination from the pole D, describe an arch intersecting it in *i*: this point *i* will be the place of that star.

7. All the stars of a constellation being thus laid down, the figure of the constellation is to be drawn according to Bayer, Hevelius, or Flamsteed.

8. Lastly, after the same manner are the declinations and right ascensions of each degree of the ecliptic *d g* to be determined.

9. The surface of the globe thus projected on a plane is to be engraven on copper, to save the trouble of doing this over again for each globe.

10. A ball, in the mean time, is to be prepared of paper, plaster, &c. as before directed, and of the intended diameter of the globe; on this, by means of a semicircle and style, is the equator to be drawn; and through every 30th degree a meridian. The ball thus divided into twelve parts, corresponding to the segments before projected, the latter are to be cut from the printed paper, and pasted on the ball.

11. Nothing now remains but to hang the globe as before in a brazen meridian and wooden horizon; to which may be added a quadrant of altitude made of brass, and divided in the same manner as the ecliptic and equator.

If the declinations and right ascensions of the stars be not given, but the longitudes and latitudes in lieu thereof, the surface of the globe is to be projected after the same manner as before; except that, in this case,

Globe.

Globe. case, D and E, fig. 2. are the poles of the ecliptic, and *fb* the ecliptic itself; and that the polar circles and tropics, with the equator *g d*, and the parallels thereof, are to be determined from their declinations.

M. De La Lande, in his *Astronomie* 1771, Tom. 3. p. 736, relates the following methods. "To construct celestial and terrestrial globes, gores must be engraved, which are a kind of projection, or inclosure of the globe (fig. 3.) similar to what is now to be explained. The length PC of the axis of this curve is equal to a quarter of the circumference of the globe; the intervals of the parallels on the axis PC are all equal, the radii of the circles KDI which represent the parallels are equal to the cotangents of the latitudes, and the arches of each, as DI, are nearly equal to the number of the degrees of the breadth of the gore (which is usually 30°) multiplied by the sine of the latitude: thus, there will be found no intricacy in tracing them; but the difficulty proceeds from the variation found in the trial of the gores when pasting them on the globe, and of the quantity that must be taken from the paper, less on the sides than in the middle; (because the sides are longer) to apply it exactly to the space that it should cover.

"The method used among workmen to delineate the gores, and which is described by Mr Bion (*Usage des Globes*, Tome 3.) and by Mr Robert de Vaugendy in the 7th volume of the *Encyclopédie* is little geometrical, but yet is sufficient in practice. Draw on the paper a line AC, equal to the chord of 15° , to make the half breadth of the gore; and a perpendicular PC, equal to three times the chord of 30° , to make the half length: for these papers, the dimensions of which will be equal to the chords, become equal to the arcs themselves when they are pasted on the globe. Divide the height CP into 9 parts, if the parallels are to be drawn in every 10° ; divide also the quadrant BE into 9 equal parts through each division point of the quadrant as G; and through the corresponding point D of the right line CP draw the perpendiculars HGF and DF, the meeting of which in F gives one of the points of the curve BEP, which will terminate the circumference of the gore. When a sufficient number of points are thus found, trace the outline PIB with a curved rule. By this construction are given the gore breadths, which are on the globe, in the ratio of the cosines of the latitudes; supposing these breadths taken perpendicular to CD, which is not very exact, but it is impossible to prescribe a rigid operation sufficient to make a plane which shall cover a curved surface, and that on a right line AB shall make lines PA, PC, PB, equal among themselves, as they ought to be on the globe. To describe the circle KDI which is at 30° from the equator: there must be taken above D a point which shall be distant from it the value of the tangent of 60° , taken out either from the tables, or on a circle equal to the circumference of the globe to be traced; this point will serve as a centre for the parallel DI, which should pass through the point D, for it is supposed equal to that of a cone circumscribing the globe, and which would touch at the point D.

"The meridians may be traced to every 10 degrees, by dividing each parallel, as KI, into three parts at the points L and M, and drawing from the pole P, through

all these division points, curves, which represent the intermediate meridians between PA and PB, (as BR and ST, fig. 4.). The ecliptic AQ may be described by means of the known declination from different points of the equator that may be found in a table; for 10° , it is $3^\circ 58'$; for 20° , $7^\circ 50' = BQ$; for 30° , $11^\circ 29'$, &c."

It is observed in general, that the paper on which charts are printed, such as the *colombier*, shortens itself $\frac{1}{4}$ part or a line in six inches upon an average, when it is dried after printing; this inconvenience must therefore be corrected in the engraving of the gores: if notwithstanding that, the gores are found too short, it must be remedied by taking from the surface of the ball a little of the white with which it is covered; thereby making the dimensions suitable to the gore as it was printed. But what is singular is, that in drawing the gore, moistened with the paste to apply on the globe, the axis GH lengthens, and the side AK shortens, in such a manner, that neither the length of the side ACK nor that of the axis GEH of the gore are exactly equal to the quarter of the circumference of the globe, when compared to the figure on the copper, or to the numbered sides shown in fig. 4. Mr Bonne having made several experiments on the dimensions that gores take after they had been parted ready to apply to the globe, and particularly with the paper named *jesus* that he made use of for a globe of one foot in diameter, found that it was necessary to give to the gores, on the copper, the dimensions shown in fig. 4. Supposing that the radius of the globe contained 720 parts, the half breadth of the gore is $AG = 188\frac{1}{5}$, the distance AC for the parallel of 10 degrees taken on the right line LM is 128.1, the small deviation from the parallel of 10 degrees in the middle of the gore ED is 4, the line ABN is right, the radius of the parallel of 10° or of the circle CEF is 4083, and so of the others as marked in the figure. The small circular cap which is placed under H, has its radius 253 instead of 247, which it would have if the sine of 20° had been the radius of it.

For the uses, &c. of the globes, see GEOGRAPHY and ASTRONOMY, with the Plates there referred to.

GLOBE-Animal. See ANIMALCULE, n° 29.

GLOBE-Fish. See OSTRACION.

GLOBULARIA, GLOBULAR BLUE DAISY: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 48th order, *Aggregate*. The common calyx is imbricated; the proper one tubulated inferior; the upper lip of the florets bipartite, the under one tripartite; the receptacle paleaceous. There are several species; but only one is commonly to be met with in our gardens, viz. the vulgaris, or common blue daisy. It hath broad thick radical leaves three parted at the ends, upright stalks from about six to 10 or 12 inches high garnished with spear-shaped leaves, and the top crowned by a globular head of fine blue flowers composed of many florets in one cup. It flowers in June, and makes a good appearance; but thrives best in a moist shady situation. It is propagated by parting the roots in September.

GLOBULE, a diminutive of globe, frequently used by physicians in speaking of the red particles of the blood. See BLOOD.

GLO.

GLOCESTER, the capital of Gloucestershire in England, 101 miles from London. It is an ancient city; and by Antoninus is called *Clevum*, or *Glevum*, which Camden thinks was formed from the British *Caer-Glowe*, signifying "a fair city." It was one of the 28 cities built by the Britons before the arrival of the Romans. By the Romans it was made one of their colonies, and in the eighth century it was esteemed one of the noblest cities in the kingdom. It has suffered considerably by fire at different periods. It stands upon a hill; and from the middle of the city, where the four principal streets meet, there is a descent every way, which makes it not only clean and healthy, but adds to the beauty of the place. Forging of iron seems to have been its manufactory so early as the time of William the Conqueror. King Henry VIII. made it the see of a bishop, with a dean and six prebends. Its castle, which was erected in the time of William the Conqueror, is very much decayed: part of it is leased out by the crown; and the rest serves for a prison, one of the best in England. In its cathedral, which is an ancient but magnificent fabric, and has a tower reckoned one of the most curious pieces of architecture in England, are the tombs of Robert duke of Normandy, son to William the Conqueror, and of Edward II. and there is a whispering-place like to that of St Paul's at London. In the chapter-house lies Strongbow who conquered Ireland. There are 12 chapels in it, with the arms and monuments of many great persons. King John made it a borough to be governed by two bailiffs. Henry III. who was crowned here, made it a corporation. By its present charter from Charles I. it is governed by a steward, who is generally a nobleman; a mayor; a recorder; 12 aldermen, out of whom the mayor is chosen; a town-clerk; 2 sheriffs, chosen yearly out of 26 common councilmen; a sword bearer; and four sergeants at mace. Here are 12 incorporated trading companies, whose masters attend the mayor on all public occasions, &c. Besides the cathedral, there are five parish churches in this city; which is likewise well provided with hospitals, particularly an infirmary upon the plan of those at London, Winchester, Bath, &c. Here is a good stone-bridge over the river Severn, with a quay, wharf, and customhouse; but most of its business is engrossed by Bristol. King Edward I. held a parliament here in 1272, wherein some good laws were made, now called the *Statutes of Gloucester*; and he erected a gate on the south side of the abbey, still called by his name, though almost demolished in the civil wars. King Richard II. also held a parliament here: and king Richard III. in consideration of his having (before his accession to the crown) borne the title of *Duke of Gloucester*, added the two adjacent hundreds of Dudston and King's Barton to it, gave it his sword and cap of maintenance, and made it a county of itself by the name of the *county of the city of Gloucester*. But after the restoration the hundreds were taken away by act of parliament, and the walls pulled down; because the city shut the gates against Charles I. when he besieged it in 1643; by which, though the siege was raised by the earl of Essex, it had suffered 20,000*l.* damage, having 241 houses destroyed, which reduced it so much that it has scarce recovered its former size and grandeur. Before that time it had 11 parish churches, but six of

them were then demolished. Here are abundance of crosses, and statues of the English kings, some of whom kept their Christmas here; several market-houses supported with pillars; and large remains of monasteries, which were once so numerous, that it gave occasion to the monkish proverb, *As sure as God is in Gloucester*. Here is a barley market; and a hall for the assizes, called the *Booth-hall*. Its chief manufacture is pins. In this branch it is astonishing the number of people who are employed, there being at least 14 or 15 different processes. Under the bridge is a water engine to supply the town, and it is served with it also from Robin Hood's well, to which is a fine walk from the city. Camden says, that the famous Roman way, called *Ermin-street*, which begins at St David's in Pembrokeshire, and reaches to Southampton, passes through this city. Sudmead in the neighbourhood is noted for horse-races. The markets here are on Wednesday and Sunday; and fairs April 5th, July 5th, September 28th, and November 28th, the latter chiefly for fat hogs. Here is a charity-school for above 80 children, of whom above 70 are also clothed; and a well endowed blue-coat school. The city sends two members to parliament. The duke of Gloucester is next brother to George III.

GLOCESTERSHIRE, a county of England, is bounded on the west by Monmouthshire and Herefordshire, on the north by Worcestershire, on the east by Oxfordshire and Warwickshire, and on the south by Wiltshire and part of Somersetshire. It is sixty miles in length, twenty six in breadth, and one hundred and sixty in circumference; containing 1,100,000 acres, 26,760 houses, 162,560 inhabitants, 290 parishes, 140 are impropriations, 1229 villages, 2 cities, and 28 market-towns. It sends only 8 members to parliament, 6 for three towns, viz. Gloucester, Tewkesbury, and Cirencester; and 2 for the county. Its manufactures are woollen cloths of various kinds, mens hats, leather, pens, paper, bar-iron, edge-tools, nails, wire, tinned-plates, brads, &c.: and of the principal articles of commerce of the county, it exports cheese 8000 tons; bacon, grain, cyder, 5000*l.* worth; perry, fish, 4000*l.* worth, &c. It lies in the diocese that takes its name from the capital, and in the Oxford circuit. The air of the county is very wholesome, but the face of it is very different in different parts: for the eastern part is hilly, and is called *Cotteswold*; the western woody, and called the *Forest of Dean*; and the rest is a fruitful valley, through which runs the river Severn. This river is in some places between two and three miles broad; and its course through the country, including its windings, is not less than seventy miles. The tide of flood, called the *Boar*, rises very high, and is very impetuous. It is remarkable, that the greatest tides are one year at the full moon, and the other at the new; one year the night-tides, and the next the day. This river affords a noble conveyance for goods and merchandise of all sorts to and from the county; but it is watered by several others, as the Wye, the Avon, the Isis, the Leden, the Frome, the Stroud, and Windrush, besides lesser streams, all abounding with fish, the Severn in particular with salmon, conger-eels, and lampreys. The soil is in general very fertile, though pretty much diversified, yielding plenty of corn, pasture, fruit, and wood. In the hilly part

part of the county, or Cottewold, the air is sharper than in the lowlands; and the soil, though not so fit for grain, produces excellent pasture for sheep; so that of the four hundred thousand that are computed to be kept in the county, the greater part are fed here. Of these sheep the wool is exceeding fine; and hence it is that this shire is so eminent for its manufacture of cloth, of which fifty thousand pieces are said to have been made yearly, before the practice of clandestinely exporting English wool became so common. In the vale, or lower part of the county, through which the Severn passes, the air and soil are very different from those of the Cottewold: for the former is much warmer, and the latter richer, yielding the most luxuriant pastures; in consequence of which, numerous herds of black cattle are kept, and great quantities of that excellent cheese, for which it is so much celebrated, made in it. The remaining part of the county, called the *Forest of Dean*, was formerly almost entirely over-run with wood, and extended 20 miles in length and 10 in breadth. It was then a nest of robbers, especially towards the Severn; but now it contains many towns and villages, consisting chiefly of miners, employed in the coal-pits, or in digging for or forging iron-ore, with both which the forest abounds. These miners have their particular laws, customs, courts, and judges; and the king, as in all royal forests, has a swain-mote for the preservation of the vert and venison. This forest was anciently, and is still, noted for its oaks, which thrive here surprisingly; but as there is a prodigious consumption of wood in the forges, it is continually dwindling away. A navigable canal is made from Stroud to Framilode, forming a junction between the Severn and Thames. Its chalybeate springs are: St Anthony's well, in Abbenhall parish; at Barrow and Maredon, in Bodington parish; at Ash-Church, near Tewkesbury; at Dumbleton, near Winchcomb; at Easington, near Dursley; and at Cheltenham. Its ancient fortifications attributed to the Romans, Saxons, or Danes, are at Abiston and Wick, and at Dointon, Dixon, Addlethorp, Knole, Over Upton, Hanham, Bodington, and Bourton on the Water.

GLOCHIDION, in botany: A genus of the syngenesia order, belonging to the monoecia class of plants. There is no calyx; the corolla consists of six egg-shaped concave petals; the stamina are three very small inconspicuous filaments; the antheræ cylindric and erect; the female flowers have no calyx; the corolla is parted into six; the pericarpium is a depressed roundish capsule with six cells; the seeds are roundish and foliary.

GLOGAW, a strong and considerable town of Germany, in Silesia, and capital of a duchy of the same name. It is not very large, but is well fortified on the side of Poland. It has a handsome castle, with a tower, in which several counsellors were condemned by Duke John, in 1498, to perish with hunger. Besides the Papists, there are a great number of Protestants and Jews. It was taken by assault, by the king of Prussia, in 1741, and the garrison made prisoners. After the peace in 1742, the king of Prussia settled the supreme court of justice here, it being, next to Breslaw, the most populous place in Silesia. It is seated on the river Oder, in E. Long. 15. 13. N. Lat. 51. 40.

GLOGAW the LESS, a town of Silesia, in the duchy of Opelen, now in possession of the king of Prussia. It is two miles S. E. of great Glogaw, and 45 N. W. of Breslaw. E. Lon. 16. 15. N. Lat. 51. 38.

GLORIA PATRI, among ecclesiastical writers. See DOXOLOGY.

GLORIOSA, SUPERB LILY: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 11th order, *Sarmentaceæ*. The corolla is hexapetalous, undulated, and reflected; the style oblique. There is but one species, a native of Malabar. It hath a thick, fleshy, tuberous root, sending forth from its centre declinated round stalks growing eight or ten feet long, and garnished with very long narrow leaves running out into a point, terminated by a long tendril. From the upper part of the stalks proceed large flame-coloured drooping flowers, consisting of six widely spreading reflexed petals. It flowers in June and July; and is of admirable beauty, whence its name of *Gloriosa*, or Superb Lily.—This plant being a native of a very warm climate, requires the protection of a hot-house in this country. The flower-stalks shoot forth in March or April; which being long and trailing, must have tall sticks placed for their support. The plants are propagated by offsets, which are produced in tolerable plenty, and may be separated any time after the stalks decay, or in spring before new ones arise.

GLORY, renown or celebrity. The love of renown, or desire of fame and reputation, appears to be one of the principal springs of action in human society. Glory therefore is not to be contemned, as some of the ancient philosophers affected to teach: but it imports us to regulate our pursuit after it by the dictates of reason; and if the public approbation will not follow us in that course, we must leave her behind. We ought to have our judgments well instructed as to what actions are truly glorious; and to remember, that in every important enterprise, as Seneca observes, *Reâe facti fecisse merces est; officii fructus, ipsum officium est*: "The reward of a thing well done, is to have done it; the fruit of a good office is the office itself." Those who by other methods scatter their names into many mouths, show they rather hunt after a great reputation than a good one, and their reward is oftener infamy than fame.

Men generally, and almost instinctively, affix glory only to such actions as have been produced by an innate desire for public good; and we measure it by that degree of influence which any thing done has upon the common happiness.

If the actions of the hero conduct soonest to glory and with the greatest splendor, and if the victorious general is so great after a signal engagement; it is because the service he has done is for the moment, and for all; and because we think, without reflecting, that he has saved our habitations, our wealth, and our children, and every thing that attaches us to life. If the man of science, who in his study has discovered and calculated the motions of the heavenly bodies, who in his alembics has unveiled some of the secrets of nature, or who has exhibited to mankind a new art, rises to fame with less noise; it is because the utility which he procures is more widely diffused, and is often of less

Glogaw
||
Glory.

Glory.

less service to the present than to succeeding generations.

The consequences, therefore, of these two advantages are as opposite as the causes are different; and while the benefits procured by the warrior appear to have no more influence, and while his glory becomes obscure, that of a celebrated writer or inventor still increases, and is more and more enlarged. His works every day bring back his name to that age which uses them, and thus still add to his celebrity and fame.

This posthumous fame indeed has been decried by some writers. In particular, the author of the *Religion of Nature delineated* has treated it as highly irrational and absurd. "In reality (says he) the man is not known ever the more to posterity, because his name is transmitted to them: He doth not live, because his name does. When it is said, Julius Cæsar subdued Gaul, conquered Pompey, &c. it is the same thing as to say, the conqueror of Pompey was Julius Cæsar; i. e. Cæsar and the conqueror of Pompey is the same thing; Cæsar is as much known by one designation as by the other. The amount then is only this, that the conqueror of Pompey conquered Pompey; or somebody conquered Pompey; or rather, since Pompey is as little known now as Cæsar, somebody conquered somebody. Such a poor business is this boasted immortality! and such is the thing called glory among us! To discerning men this fame is mere air, and what they despise if not shun."

But surely it were to consider too curiously (as Horatio says to Hamlet) to consider thus. For (as the elegant author of Fitzosborne's Letters observes) altho' fame with posterity should be, in the strict analysis of it, no other than what is here described, a mere uninteresting proposition, amounting to nothing more than that somebody acted meritoriously; yet it would not necessarily follow, that true philosophy would banish the desire of it from the human breast: for this passion may be (as most certain it is) wisely implanted in our species, notwithstanding the corresponding object should in reality be very different from what it appears in imagination. Do not many of our most refined and even contemplative pleasures owe their existence to our mistakes? It is but extending some of our senses to a higher degree of acuteness than we now possess them, to make the fairest views of nature, or the noblest productions of art, appear horrid and deformed. To see things as they truly and in themselves are, would not always, perhaps, be of advantage to us in the intellectual world, any more than in the natural. But, after all, who shall certainly assure us, that the pleasure of virtuous fame dies with its possessor, and reaches not to a farther scene of existence? There is nothing, it should seem, either absurd or unphilosophical in supposing it possible at least, that the praises of the good and the judicious, the sweetest music to an honest ear in this world, may be echoed back to the mansions of the next; that the poet's description of fame may be literally true, and though she walks upon earth, she may yet lift her head into heaven.

To be convinced of the great advantage of cherishing this high regard to posterity, this noble desire of an after-life in the breath of others, one need only look back upon the history of the ancient Greeks and Romans. For what other principle was it which produced that exalted strain of virtue in those days,

N^o 140.

that may well serve, in too many respects, as a model to these? Was it not the *consentientis laus bonorum*, the *in-corrupta vox bene judicantium* (as Tully calls it), "the concurrent approbation of the good, the uncorrupted applause of the wise," that animated their most generous pursuits?

In short, can it be reasonable to extinguish a passion which nature has universally lighted up in the human breast, and which we constantly find to burn with most strength and brightness in the noblest and best formed bosoms? Accordingly revelation is so far from endeavouring to eradicate the seed which nature has thus deeply planted, that she rather seems, on the contrary, to cherish and forward its growth. To be *exalted with honour*, and to be *had in everlasting remembrance*, are in the number of those encouragements which the Jewish dispensation offered to the virtuous; and the person from whom the sacred Author of the Christian system received his birth, is herself represented as rejoicing that *all generations should call her blessed*.

GLOSS, a comment on the text of any author, to explain his sense more fully and at large, whether in the same language or any other. See the article COMMENTARY.—The word, according to some, comes from the Greek γλωσσα, "tongue;" the office of a *gloss* being to explain the text, as that of the tongue is to discover the mind.

Gloss is likewise used for a literal translation, or an interpretation of an author in another language word for word.

Gloss is also used in matters of commerce, &c. for the lustre of a silk, stuff, or the like.

GLOSSARY, a sort of dictionary, explaining the obscure and antiquated terms in some old author; such are Du Cange's Latin and Greek Glossaries, Spelman's Glossary, and Kennet's Glossary at the end of his *Parochial Antiquities*.

GLOSSOPETRA, or GLOTTOPETRA, in natural history, a kind of extraneous fossil, somewhat in form of a serpent's tongue; frequently found in the island of Malta and divers other parts. See Plate CC.

The vulgar notion is, that they are the tongues of serpents petrified; and hence their name, which is a compound of γλωσσα, "tongue," and πετρα, "stone." Hence also their traditional virtue in curing the bites of serpents. The general opinion of naturalists is, that they are the teeth of fishes, left at land by the waters of the deluge, and since petrified.

The several sizes of the teeth of the same species, and those of the several different species of sharks, afford a vast variety of these fossil substances. Their usual colours are black, bluish, whitish, yellowish, or brown; and in shape they usually approach to a triangular figure. Some of them are simple; others are tricuspidate, having a small point on each side of the large one: many of them are quite straight; but they are frequently found crooked, and bent in all directions; many of them are ferrated on their edges, and others have them plain; some are undulated on their edges, and slightly ferrated on these undulations. They differ also in size as much as in figure; the larger being four or five inches long, and the smaller less than a quarter of an inch.

They are most usually found with us in the strata of blue clay, though sometimes also in other substances,

and

Gloss

P

Glossopetra.

petra.

Glottis
||
Glover.

and are frequent in the clay-pits of Richmond and other places. They are very frequent also in Germany, but no where so plentiful as in the island of Malta.

The Germans attribute many virtues to these fossil teeth; they call them cordials, sudorifics, and alexipharmics: and the people of Malta, where they are extremely plentiful, hang them about their childrens necks to promote dentition. They may possibly be of as much service this way as an anodyne necklace; and if suspended in such a manner that the child can get them to its mouth, may, by their hardness and smoothness, be of the same use as a piece of coral.

GLOTTIS, in anatomy, the narrow slit at the upper part of the aspera arteria, which is covered by the epiglottis when we hold our breath and when we swallow. The glottis, by its dilatation and contraction, modulates the voice. See ANATOMY, n° 116.

GLOVE, a covering for the hand and wrist.

Gloves, with respect to commerce, are distinguished into leathern-gloves, silk-gloves, thread-gloves, cotton-gloves, worsted-gloves, &c. Leathern gloves are made of chamois, kid, lamb, doe, elk, buff, &c. Gloves now pay a duty to the king, which increases according to their value.

To throw the glove, was a practice or ceremony very usual among our forefathers; being the challenge whereby another was defied to single combat.—It is still retained at the coronation of our kings; when the king's champion casts his glove in Westminster-hall. See CHAMPION.

Favyn supposes the custom to have arisen from the eastern nations, who in all their sales and deliveries of lands, goods, &c. used to give the purchaser their glove by way of livery or investiture. To this effect he quotes Ruth iv. 7. where the Chaldee paraphrase calls *glove*, what the common version renders by *shoe*. He adds, that the Rabbins interpret by *glove*, that passage in the cxiith Psalm, *In Idumeam extendam calcamentum meum*, "Over Edom will I cast out my shoe."—Accordingly, among us, he who took up the *glove*, declared thereby his acceptance of the challenge; and as a part of the ceremony, continues Favyn, took the *glove* off his own right hand, and cast it upon the ground, to be taken up by the challenger. This had the force of a mutual engagement on each side, to meet at the time and place which should be appointed by the king, parliament, or judges.—The same author asserts, that the custom which still obtains of blessing *gloves* in the coronation of the kings of France, is a remain of the eastern practice of giving possession with the *glove*, l. xvi. p. 1017, &c.

Anciently it was prohibited the judges to wear gloves on the bench. And at present in the stables of most princes, it is not safe going in without pulling off the gloves.

GLOVER (Richard), the author of *Leonidas* and several other esteemed works, was the son of Richard Glover a Hamburgh merchant in London, and was born in St Martin's-lane in the year 1712. He very early showed a strong propensity to and genius for poetry; and while at school, he wrote, amongst other pieces, a poem to the memory of Sir Isaac Newton, prefixed to the view of that incomparable author's philosophy, published in 4to, in 1728, by his intimate

friend Dr Pemberton. But though possessed of talents which were calculated to excel in the literary world, he was content to devote his attention to commerce, and at a proper period commenced a Hamburgh merchant. He still, however, cultivated literature, and associated with those who were eminent in science. One of his earliest friends was Matthew Green, the ingenious but obscure author of some admirable poems, which in 1737, after his death, were collected and published by Mr Glover. In 1737, Mr Glover married Miss Nunn, with whom he received a handsome fortune; and in the same month published *Leonidas*, a poem in 4to, which in this and the next year passed through three editions. This poem was inscribed to Lord Cobham; and on its first appearance was received by the world with great approbation, though it has since been unaccountably neglected. Lord Lyttelton, in a popular publication called *Common Sense*, and in a poem addressed to the author, praised it in the warmest terms; and Dr Pemberton published, *Observations on Poetry*, especially epic, occasioned by the late poem upon *Leonidas*, 1738, 12mo, merely with a view to point out its beauties. In 1739, Mr Glover published "*London, or the Progress of Commerce*", 4to; and a ballad intitled, *Hofier's Ghost*. Both these pieces seem to have been written with a view to incite the public to resent the misbehaviour of the Spaniards; and the latter had a very considerable effect.—The political dissensions at this period raged with great violence, and more especially in the metropolis; and at different meetings of the livery on those occasions, Mr Glover was always called to the chair, and acquitted himself in a very able manner, his conduct being patriotic and his speeches masterly. His talents for public speaking, his knowledge of political affairs, and his information concerning trade and commerce, soon afterwards pointed him out to the merchants of London as a proper person to conduct their application to parliament on the subject of the neglect of their trade. He accepted the office; and in summing up the evidence gave very striking proofs of his oratorical powers. This speech was pronounced Jan. 27. 1742.

In the year 1744 died the Duchess of Marlborough, and by her will left to Mr Glover and Mr Mallet 500l. each, to write the History of the Duke of Marlborough's Life. This bequest, however, never took place. It is supposed that Mr Glover very early renounced his share of it; and Mallet, though he continued to talk of performing the task almost as long as he lived, is now known never to have made the least progress in it. About this period Mr Glover withdrew a good deal from public notice, and lived a life of retirement. He had been unsuccessful in his business; and with a very laudable delicacy had preferred an obscure retreat to popular observation, until his affairs should put on a more prosperous appearance. He had been honoured with the attention of Frederic Prince of Wales, who once presented him with a complete set of the Classics, elegantly bound; and, on his absenting himself for some time on account of the embarrassment in his circumstances, sent him, it is said, 500l. The prince died in March 1751; and in May following Mr Glover was once more drawn from his retreat by the importunity of his friends, and stood candidate for the place of chamberlain of London. It unfortunately

Glover.

Glover. happened that he did not declare himself until most of the livery had engaged their votes; by which means he lost his election.

In 1753, Mr Glover produced at Drury-lane his tragedy of *Boadicea*; which was acted nine nights, in the month of December. It had the advantage of the performance of Mr Garrick, Mr Moflop, Mrs Cibber, and Mrs Pritchard. From the prologue it seems to have been patronized by the author's friends in the city; and Dr Pemberton wrote a pamphlet to recommend it.—In 1761, Mr Glover published *Medea*, a tragedy written on the Greek model; but it was not acted until 1767, when it appeared for the first time on the stage at Drury-lane for Mrs Yates's benefit. At the accession of his present majesty, he appears to have surmounted the difficulties of his situation. In the parliament which was then called, he was chosen member for Weymouth, and continued to sit as such until the dissolution of it. He, about this time, interested himself about India affairs, at one of Mr Sullivan's elections; and in a speech introduced the fable of the man, horse, and bear; and drew this conclusion, that, whenever merchants made use of armed forces to maintain their trade, it would end in their destruction.

In 1770, the poem of *Leonidas* requiring a new edition, it was republished in two volumes 12mo, corrected throughout, and extended from nine books to twelve. It had also several new characters added, besides placing the old ones in new situations. The improvements made in it were very considerable; but we believe the public curiosity, at this period, was not sufficiently alive to recompense the pains bestowed on this once popular performance. The calamities arising from the wounds given to public credit, in June 1772, by the failure of the bank of Douglas, Heron, and Co. in Scotland, occasioned Mr Glover's taking a very active part in the settling those complicated concerns, and in stopping the distress then so universally felt. In February 1774, he called the annuitants of that banking-house together, at the King's Arms tavern, and laid proposals before them for the security of their demands, with which they were fully satisfied. He also undertook to manage the interests of the merchants and traders of London concerned in the trade to Germany and Holland, and of the dealers in foreign linens, in their application to parliament in May 1774. Both the speeches made on these occasions were published in a pamphlet in that year. In the succeeding year he engaged on behalf of the West-India merchants in their application to parliament, and examined the witnesses and summed up the evidence in the same masterly manner he had done on former occasions. For the assistance he afforded the merchants in this business, he was complimented by them with a service of plate, of the value of 300l. The speech which he delivered in the house was in the same year printed. This, we believe, was the last opportunity he had of displaying his oratorical talents in public. Having now arrived at a period of life which demanded a recess from business, Mr Glover retired to ease and independence, and wore out the remainder of his days with dignity and with honour. It is probable that he still continued his attention to his muse, as we are informed that, besides an epic poem of considerable length, he has left some tragedies and comedies behind

him in manuscript. After experiencing for some time the infirmities of age, he departed this life 25th November 1785; leaving behind him a most estimable character as a man, a citizen, and a writer.

GLOW-WORM, in zoology. See *LAMPYRIS*.

GLUCKSTADT, a strong and considerable town of Germany, in the circle of Upper Saxony, and duchy of Holstein, with a strong castle, and subject to Denmark. It is seated on the river Elbe, near its mouth; E. Long. 9. 15. N. Lat. 52. 53.

GLUE, among artificers, a tenacious viscid matter, which serves as a cement to bind or connect things together.

Glues are of different kinds, according to the various uses they are designed for, as the common-glue, glove-glue, and parchment-glue; whereof the two last are more properly called *size*.

The common or strong glue is chiefly used by carpenters, joiners, cabinet-makers, &c. It is made of skins of animals, as oxen, cows, calves, sheep, &c.; and the older the creature is, the better is the glue made of its hide. Indeed whole skins are but rarely used for this purpose, but only the shavings, parings, or scraps of them; or the feet-sinews, &c. That made of whole skins, however, is undoubtedly the best; as that made of sinews is the very worst.

The Method of Making GLUE. In making glue of parings, they first steep them two or three days in water: then, washing them well out, they boil them to the consistence of a thick jelly; which they pass, while hot, through ozier-baskets, to separate the impurities from it; and then let it stand some time, to purify it further: when all the filth and ordures are settled to the bottom of the vessel, they melt and boil it a second time. They next pour it into flat frames or moulds; whence it is taken out pretty hard and solid, and cut into square pieces or cakes. They afterwards dry it in the wind, in a sort of coarse net; and at last string it, to finish its drying.

The glue made of sinews, feet, &c. is managed after the same manner; only with this difference, that they bone and scour the feet, and do not lay them to steep.

Of this commodity there is a very great exportation from England; the English glue being universally allowed to be the best in Europe, partly from the excellency of the materials, and partly from the skill of the manufacturers. Next to this is the Flanders glue. In both countries it is made by the tanners from fragments of good skins dried with much care. In France it is a separate trade: and the glue-makers pick up their materials as they can, from the several dealers in skins, and boiling these with cow-heels make their glue; which as they purchase every thing, must render it dear, as well as of an inferior quality. The duty on exportation is tenpence, and on importation three shillings and tenpence, on every hundred weight.

The best glue is that which is made from the skin of the oldest beast, especially if a bull's hide is used. Experience likewise shows that glue is considerably improved in quality by keeping after it is made; and the surest way to try its goodness is to lay a piece to steep three or four days, and if it swell considerably without melting, and when taken out resumes its former dryness, it is excellent.

A glue that will hold against fire or water, it is said,

Glow
||
Glue.

Glue
Gluttony.

said, may be made thus : Mix a handful of quicklime with four ounces of linseed oil ; boil them to a good thickness ; then spread it on tin-plates in the shade, and it will become exceeding hard, but may be easily dissolved over a fire, as glue, and will effect the business to admiration.

Neumann observes, that glue dissolved in a solution of lapis calaminaris in spirit of nitre, and afterwards inspissated, forms an extremely slippery tenacious mass, which might be of use for entangling flies, caterpillars, and other insects, if it was not too expensive.

Method of Preparing and Using GLUE. Set a quart of water on the fire, then put in about half a pound of good glue, and boil them gently together till the glue be entirely dissolved and of a due consistence. When glue is to be used, it must be made thoroughly hot ; after which, with a brush dipped in it, besmear the faces of the joints as quick as possible : then clapping them together, slide or rub them lengthwise one upon another, two or three times, to settle them close ; and so let them stand till they are dry and firm.—Mr Boyle gives a receipt for preparing a fine strong glue from isinglass in the following manner : Steep the isinglass for 24 hours in common brandy. When the menstruum has opened and mollified the isinglass, they must be gently boiled together, and kept stirring till they appear well mixed, and till a drop thereof, suffered to cool, turns into a strong jelly. Then strain it, whilst hot, through a clean linen cloth into a vessel to be kept close stoppered. A gentle heat suffices to dissolve this glue into a transparent and almost colourless fluid, but very strong ; so that pieces of wood glued together with it will separate elsewhere rather than in the place where they are joined. See ISINGLASS.

GLUME (*gluma*), among botanists, a species of calyx, consisting of two or three membranous valves, which are often pellucid at the edges. This kind of calyx belongs to the grasses.

GLUT, among falconers, the slimy substance that lies in a hawk's paunch.

GLUTA, in botany ; a genus of the pentandria order, belonging to the gynandria class of plants. The calyx is campanulated and deciduous ; there are five petals glued below to the column of the germ ; and the filaments inserted on the top of the column, on which also the germen sits.

GLUTEUS, a name common to three muscles whose office it is to extend the thigh. See ANATOMY, *Table of the Muscles.*

GLUTTON, in zoology. See MUSTELA.

GLUTTONY, a voracity of appetite, or a propensity to gormandizing.

There is a morbid sort of gluttony, called *fames canina*, "dog-like appetite," which sometimes occurs, and renders the person seized with it an object of pity and of cure as in other diseases : (see BULIMY.)—But professed habitual gluttons may be reckoned amongst the monsters of nature, and deemed in a manner punishable for endeavouring to bring a dearth or famine into the places where they live. For which reason, people think king James I. was in the right, when a man being presented to him that could eat a whole sheep at one meal, he asked "What he could do more than another

man?" and being answered "He could not do so much," said, "Hang him then ; for it is unfit a man should live that eats so much as twenty men, and cannot do so much as one."

The emperor Clodius Albinus would devour more apples at once than a bushel would hold. He would eat 500 figs to his breakfast, 100 peaches, 10 melons, 20 pound weight of grapes, 100 gnat-snappers, and 400 oysters. "Fye upon him (saith Lipsius) ; God keep such a curse from the earth."

One of our Danish kings named *Hardiknute* was so great a glutton, that a historian calls him *Basca de Porco*, "Swine's-mouth." His tables were covered four times a-day with the most costly viands that either the air, sea, or land, could furnish : and as he lived he died ; for, revelling and carousing at a wedding-banquet at Lambeth, he fell down dead. His death was so welcome to his subjects, that they celebrated the day with sports and pastimes, calling it *Hock-tide*, which signifies scorn and contempt. With this king ended the reign of the Danes in England.

One Phagon, under the reign of the emperor Aurelianus, at one meal, eat a whole boar, 100 loaves of bread, a sheep, a pig, and drank above three gallons of wine.

We are told by Fuller*, that one Nicholas Wood, * *Worthies*, of Harrison in Kent, eat a whole sheep of 16 s. price at one meal, raw ; at another time, 30 dozen of pigeons. At Sir William Sidley's, in the same county, he eat as much victuals as would have sufficed 30 men. At Lord Wotton's mansion-house in Kent, he devoured at one dinner 84 rabbits ; which, by computation, at half a rabbit a man, would have served 168 men. He eat to his breakfast 18 yards of black pudding. He devoured a whole hog at one sitting down ; and after it, being accommodated with fruit, he eat three pecks of damsons.

A counsellor at law, whose name was Mallet, well known in the reign of Charles I. eat at one time an ordinary provided in Westminster for 30 men at twelve-pence a piece. His practice not being sufficient to supply him with better sort of meat, he fed generally on offals, ox-livers, hearts, &c. He lived to almost 60 years of age, and for the seven last years of his life eat as moderately as other men. A narrative of his Life was published.

GLYCINE, KNOBBED-ROOTED LIQUORICE-VEGETA : A genus of the decandria order, belonging to the diadelphia class of plants ; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate ; the carina of the corolla turning back the vexillum with its point. There is but one species commonly cultivated in our gardens, *viz.* the frutescens, or Carolina kidney-bean tree. This hath shrubby climbing stalks, twining round any support, 15 or 20 feet high, adorned with pinnated leaves of three pair of foliicles terminated by an odd one, and from the axillas clusters of large bluish-purple flowers, succeeded by long pods like those of the climbing kidney-bean. It flowers in June and July, but the seeds do not ripen in this country. It is easily propagated, either by seeds imported from America, where it is native, or by layers.—The stalks and roots of the abrus, another species of glycine, which grows in Egypt and the Indies, are very sweet to the taste. Herman affirms, that the juice obtained

Gluttony,
Glycine.Lips. Ep.
MS. 51a
p. 457.

p. 86.

Glycir. hi.
za.

tained from them by decoction is little inferior to liquorice; whence its name of *wild-liquorice* in those parts of America where it is native.

GLYCIRRHIZA, LIQUORICE: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate; the upper lip tripartite, and the under one entire; the legumen ovate and compressed. There are two

Species. 1. The *glabra*, or common liquorice, hath a long, thick, creeping root, striking several feet deep into the ground; upright, firm, herbaceous stalks annually, three or four feet high, garnished with winged leaves of four or five pair of oval lobes, terminated by an odd one; and from the axillas erect spikes of pale blue flowers in July, succeeded by short smooth pods. The root of this is the useful part, which is replete with a sweet, balsamic, pectoral juice, much used in all compositions for coughs and disorders of the stomach. 2. The *echinata*, or prickly-podded liquorice, is nearly like the common sort, only the seed-pods are prickly. Both these species are very hardy perennials; but the first is the sort commonly cultivated for use, its roots being fuller of juice and sweeter than the other. The roots are perennial; but the stalks rise in spring and decay in autumn.

Propagation and culture. Their propagation is effected by cuttings of the small roots issuing from the sides of the main ones near the surface of the earth, dividing them into lengths of six or eight inches, each having one or more good buds or eyes; and the proper season for procuring the sets for planting is any time in open weather from October till March, though from the middle of February till the middle of March is rather the most successful season for planting. An open situation is the most suitable for a plantation of these plants. Particular regard should also be had to the soil: it ought to be of a light loose temperature, and three or four feet deep if possible; for the roots of the liquorice will arrive at that depth and more, and the longer the roots the more valuable they are for sale by weight.

Having fixed on the ground, let it be trenched three spades deep, if the depth of proper soil will admit; then having your sets ready, proceed to plant them by line and dibble, planting the sets a foot distance in each row; putting them perpendicular into the ground, with the tops about an inch under the surface; and let the rows be a foot and a half asunder; though the London gardeners seldom allow more than twelve inches between row and row. These gardeners also sow a crop of onions on the same ground the first year; which, as the onions root but slender, and spread but little at top, may be done without any detriment to the liquorice, or to the onions, as it does not rise above ten or twelve inches high the first summer; observing to keep the ground clean from weeds during that season by hoeing. If there is a crop of onions, use the small hoe, cutting out the onions to four or five inches distance, clearing away such as grow immediately close to the liquorice plants; and when the onions are gathered, give the ground a thorough hoeing with a large hoe, to loosen the surface and destroy all weeds effectually; and in autumn cut down the decayed stalks of the liquorice, and nothing more is

necessary to be done till spring; when, in February or March, give a slight digging between the rows; during spring and summer, keep down all weeds by broad-hoeing; and in autumn, when the stalks are in a decaying state, cut them down to the surface of the earth.

In three years after planting, the roots of the liquorice will be fit to take up: and the proper season for this is, any time from the beginning of November till February; for it should neither be taken up before the stalks are fully decayed, nor deferred till late in spring, otherwise the roots will be apt to shrivel and diminish in weight. In taking them up, the small side-roots are trimmed off, and the best divided into lengths for fresh sets, and the main roots are tied in bundles ready for sale. It is of advantage to sell them as soon as possible after they are taken up, before they lose much of their weight. They are sold to the druggists from about twenty to thirty or forty shillings per hundred weight; and an acre of ground has produced three thousand and upwards, which has been sold for more than sixty pounds: but the price is commonly in proportion to the goodness of the roots.

Uses. The common liquorice is cultivated in most countries of Europe for the sake of its root. That which is cultivated in Britain is preferable to such as comes from abroad; this last being generally mouldy, which this root is very apt to become, unless kept in a dry place. The powder of liquorice usually sold is often mingled with flour, and probably too often with substances not quite so wholesome: the best sort is of a brownish yellow colour (the fine pale yellow being generally sophisticated), and of a very rich sweet taste, much more agreeable than that of the fresh root. Liquorice is almost the only sweet that quenches thirst; whence it was called by the Greeks *adipsos*. Galen takes notice, that it was employed in this intention in hydropic cases, to prevent the necessity of drinking. Mr Fuller, in his *Medicina Gymnastica*, recommends this root as a very useful pectoral; and says it excellently softens acrimonious humours, at the same time that it proves gently detergent; and this account is warranted by experience. An extract is directed to be made from it in the shops; but this preparation is chiefly brought from abroad, though the foreign extract is not equal to such as is made with proper care among ourselves.

GLYPH, in sculpture and architecture, denotes any canal or cavity used as an ornament.

GMELIN (Dr Samuel), professor at Tubingen, and afterwards member of the Imperial Academy of Sciences at St Petersburg, commenced his travels in June 1768; and having traversed the provinces of Moscow, Voronetz, New Russia, Azof, Casan, and Astracan, he visited, in 1770 and 1771, the different harbours of the Caspian, and examined with peculiar attention those parts of the Persian provinces which border upon that sea, of which he has given a circumstantial account in the three volumes of his travels already published. Actuated by a zeal for extending his observations, he attempted to pass through the western provinces of Persia, which are in a perpetual state of warfare, and infested by numerous banditti. Upon this expedition he quitted, in April 1772, Einzillee, a small trading place in Ghilan, upon the southern shore

Glycir. hi.
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Gmelin.

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Gnomon.

shore of the Caspian; and, on account of many difficulties and dangers, did not, until Dec. 2. 1773, reach Sallian, a town situated upon the mouth of the river Koor. Thence he proceeded to Baku and Kuba, in the province of Shirvan, where he met with a friendly reception from Ali Feth Khan, the sovereign of that district. After he had been joined by 20 Uralian Cossacks, and when he was only four days journey from the Russian fortrefs Kislar, he and his companions were, on the 5th of February 1774, arrested by order of Usméi Khan, a petty Tartar prince, through whose territories he was obliged to pass. Usméi urged as a pretence for this arrest, that 30 years ago several families had escaped from his dominions, and had found an asylum in the Russian territories; adding, that Gmelin should not be released until these families were restored. The professor was removed from prison to prison; and at length, wearied out with continued persecutions, he expired, July 27th, at Achmet-Kent, a village of Mount Caucasus. His death was occasioned partly by vexation for the loss of several papers and collections, and partly by disorders contracted from the fatigues of his long journey. Some of his papers had been sent to Kislar during his imprisonment, and the others were not without great difficulty rescued from the hands of the barbarian who had detained him in captivity. The arrangement of these papers, which will form a fourth volume of his travels, was at first consigned to the care of Guldenstaedt, but upon his death has been transferred to the learned Pallas.

GMELINA, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, *Personate*. The calyx is nearly quadridentate; the corolla campanulate or bell-shaped; there are two bipartite and two simple antheræ; the fruit is a plum with a bilocular kernel.

GNAPHALIUM, CUDWEED, GOLDBLOCKS, ETERNAL FLOWER, &c.: A genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Composita*. The receptacle is naked; the pappus feathered; the calyx imbricated, with the marginal scales roundish, parched, and coloured. There are 41 species; the most remarkable of which are, 1. The margaritaceum, or pearly white eternal flower, hath creeping, very spreading roots, crowned with broad, spear-shaped, white, hoary leaves; herbaceous thick, woolly stalks, a foot and an half high, branching outward, garnished with long, acute-pointed, white, woolly leaves, and terminated by a corymbose cluster of yellowish flowers, which appear in June and July, and are very ornamental. 2. The plantaginifolium, hath large woolly radical leaves, decumbent running roots, and herbaceous simple stalks, rising six or eight inches high, terminated by a corymbus of white flowers in June, July, &c. 3. The stechas, hath a shrubby stalk, dividing into slender branches three feet long, terminated by corymbose clusters of yellow flowers, appearing in May and June. 4. The orientale, or oriental goldilocks, hath three varieties, with yellow, gold coloured, and white silvery flowers. They have shrubby stalks, rising two or three feet high. 5. The odoratissimum, or sweet-scented eternal flower,

hath shrubby winged stalks, branching irregularly a yard high, with corymbose clusters of bright yellow flowers, changing to a dark yellow. 6. The arboreum, or tree gnaphalium, hath a woody stem, branching four or five feet high, narrow sessile leaves, with revolute borders, smooth on their upper side, and roundish bunches of pale yellow flowers. The first three sorts are hardy, and will thrive in any soil or situation. The two first increase exceedingly by their roots; and the third is easily propagated by slips. The fourth, fifth, and sixth sorts are somewhat tender; and therefore should be kept in pots, to be sheltered in a green-house or garden frame in winter. Others may be planted in the full ground, in a dry and warm situation, especially the oriental kind and varieties, and likewise the sweet-scented kind; for these two species will struggle tolerably through an ordinary winter, and make a pretty appearance during the summer months. All these are propagated by slips or cuttings of their shoots.—The flowers of all these species are remarkable for retaining their beauty for years, if carefully gathered in a dry day, soon after they are blown.

GNAT, in zoology. See **CULEX**.

GNESNA, a large and strong town of Great Poland, of which it is capital, and in the palatinate of Calish, with an archbishop's see, whose prelate is primate of Poland, and viceroy during the vacancy of the throne. It was the first town built in the kingdom, and formerly more considerable than at present. E. Long. 18. 20. N. Lat. 52. 28.

GNETUM, in botany; a genus of the adelphia order, belonging to the monœcia class of plants. The amentum of the male is a single scale; there is no corolla, and but one filament with a pair of antheræ. The calyx of the female is of the same form; there is no corolla; the style with the stigma is trifid; the fruit a monospermous plum.

GNIDIA, in botany; a genus of the monogynia order, belonging to the octandria class of plants. The calyx is funnel shaped and quadrid, with four petals inserted into it: there is one seed somewhat resembling a berry.

GNOMES, **GNOMI**, certain imaginary beings, who, according to the cabbalists, inhabit the inner parts of the earth. They are supposed small in stature, and the guardians of quarries, mines, &c. See **FAIRY**.

GNOMON, in dialling, the style, pin, or cock of a dial, which by its shadow shows the hour of the day. The gnomon of every dial represents the axis of the world: (See **DIAL** and **DIALLING**.)—The word is Greek, γνομων, which literally implies something that makes a thing known; by reason that the style or pin indicates or makes the hour known.

GNOMON, in astronomy, a style erected perpendicular to the horizon, in order to find the altitude of the sun. Thus, in the right-angled triangle ABC are given, AB the length of the style, BC the length of its shadow, and the right angle ABC. Hence, making CB the radius, we have this analogy for finding the angle ACB, the sun's altitude, viz. BC : AB :: radius : tangent of the angle C.

By means of a gnomon, the sun's meridian altitude, and consequently the latitude of the place, may be found more exactly than with the smaller quadrants. See **QUADRANT**.

Gnomon
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Gnostics.

By the same instrument the height of any object GH may be found: for as DE, the distance of the observer's eye from the gnomon, is to DE, the height of the style; so is FH, the distance of the observer's eye from the object, to GH, its height.

See further on the uses and application of Gnomons, the article GEOGRAPHY, no° 49—53.

GNOMON of a Globe; the index of the hour-circle.

GNOMONICS, the art of dialling. See DIALLING.

GNOSTICS, ancient heretics, famous from the first rise of Christianity, principally in the east,

It appears from several passages of the sacred writings, particularly 1 John ii. 18. 1 Tim. vi. 20. and Col. ii. 8. that many persons were infected with the gnostic heresy in the first century; though the sect did not render itself conspicuous, either for number or reputation, before the time of Adrian, when some writers erroneously date its rise.

The name is formed of the Latin *gnosticus*, and that of the Greek γνῶσις “knowing,” of γινώσκω “I know;” and was adopted by those of this sect, as if they were the only persons who had the true knowledge of Christianity. Accordingly, they looked on all other Christians as simple, ignorant, and barbarous persons, who explained and interpreted the sacred writings in a too low, literal, and unedifying signification.

At first the Gnostics were only the philosophers and wits of those times, who formed for themselves a peculiar system of theology, agreeable to the philosophy of Pythagoras and Plato; to which they accommodated all their interpretations of scripture. But

GNOSTICS afterwards became a general name, comprehending divers sects and parties of heretics, who rose in the first centuries, and who, though they differed among themselves as to circumstances, yet all agreed in some common principles. They were such as corrupted the doctrine of the gospel by a profane mixture of the tenets of the oriental philosophy, concerning the origin of evil and the creation of the world, with its divine truths. Such were the Valentinians, Simonians, Carpocratians, Nicolaitans, &c.

GNOSTICS was sometimes also more particularly attributed to the successors of the first Nicolaitans and Carpocratians, in the second century, upon their laying aside the names of the first authors. Such as would be thoroughly acquainted with all their doctrines, reveries, and visions, may consult St Irenæus, Tertullian, Clemens Alexandrinus, Origen, and St Epiphanius; particularly the first of these writers, who relates their sentiments at large, and confutes them at the same time: indeed, he dwells more expressly on the Valentinians than any other sort of Gnostics; but he shows the general principles whereon all their mistaken opinions were founded, and the method they followed in explaining scripture. He accuses them with introducing into religion certain vain and ridiculous genealogies, i.e. a kind of divine processions or emanations, which had no other foundation but in their own wild imagination.

In effect, the Gnostics confessed, that these æons or emanations were no where expressly delivered in the sacred writings; but insisted at the same time, that Jesus Christ had intimated them in parables to such as could understand him. They built their theology not only on the gospels and the epistles of St Paul, but also on

the law of Moses and the prophets. These last laws were peculiarly serviceable to them, on account of the allegories and allusions with which they abound, which are capable of different interpretations: Though their doctrine, concerning the creation of the world by one or more inferior beings of an evil or imperfect nature, led them to deny the divine authority of the books of the Old Testament, which contradicted this idle fiction, and filled them with an abhorrence of Moses and the religion he taught; alleging, that he was actuated by the malignant author of this world, who consulted his own glory and authority, and not the real advantage of men. Their persuasion that evil resided in matter, as its centre and source, made them treat the body with contempt, discourage marriage, and reject the doctrine of the resurrection of the body and its re-union with the immortal spirit. Their notion, that malevolent genii presided in nature, and occasioned diseases and calamities, wars, and desolations, induced them to apply themselves to the study of magic, in order to weaken the powers or suspend the influence of their malignant agents.

The Gnostics considered Jesus Christ as the Son of God, and consequently inferior to the Father, who came into the world for the rescue and happiness of miserable mortals, oppressed by matter and evil beings: but they rejected our Lord's humanity, on the principle that every thing corporeal is essentially and intrinsically evil; and therefore the greatest part of them denied the reality of his sufferings. They set a great value on the beginning of the gospel of St John, where they fancied they saw a great deal of their æons or emanations under the *Word*, the *Life*, the *Light*, &c. They divided all nature into three kinds of beings, viz. *hylic*, or material; *psychic*, or animal; and *pneumatic*, or spiritual. On the like principle they also distinguished three sorts of men; *material*, *animal*, and *spiritual*. The first, who were material, and incapable of knowledge, inevitably perished, both soul and body; the third, such as the Gnostics themselves pretended to be, were all certainly saved; the psychic, or animal, who were the middle between the other two, were capable either of being saved or damned, according to their good or evil actions.

With regard to their moral doctrines and conduct, they were much divided. The greatest part of this sect adopted very austere rules of life, recommended rigorous abstinence, and prescribed severe bodily mortifications, with a view of purifying and exalting the mind. However, some maintained, that there was no moral difference in human actions; and thus, confounding right with wrong, they gave a loose rein to all the passions, and asserted the innocence of following blindly all their motions, and of living by their tumultuous dictates. They supported their opinions and practice by various authorities: some referred to fictitious and apocryphal writings of Adam, Abraham, Zoroaster, Christ, and his apostles; others boasted, that they had deduced their sentiments from secret doctrines of Christ, concealed from the vulgar; others affirmed, that they arrived at superior degrees of wisdom by an innate vigour of mind; and others asserted, that they were instructed in these mysterious parts of theological science by Theudas, a disciple of St Paul, and by Matthias, one of the friends of our Lord. The tenets of the ancient

Gnostics

Gnostics
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Goa.

ancient Gnostics were revived in Spain, in the fourth century, by a sect called the *Priscillianists*.

The appellation *Gnostic* sometimes also occurs in a good sense, in the ancient ecclesiastical writers, and particularly Clemens Alexandrinus, who, in the person of his Gnostic, describes the characters and qualities of a perfect Christian. This point he labours in the seventh book of his *Stromata*, where he shows, that none but the Gnostic, or learned person, has any true religion. He affirms, that were it possible for the knowledge of God to be separated from eternal salvation, the Gnostic would make no scruple to choose the knowledge; and that if God would promise him impunity in doing of any thing he has once spoken against, or offer him heaven on those terms, he would never alter a whit of his measures. In this sense the father uses Gnostics, in opposition to the heretics of the same name; affirming, that the true Gnostic is grown old in the study of the holy scripture; and that he preserves the orthodox doctrine of the apostles and of the church; whereas the false Gnostic abandons all the apostolical traditions, as imagining himself wiser than the apostles. At length the name *Gnostic*, which originally was the most glorious, became infamous, by the idle opinions and dissolute lives of the persons who bore it.

GNU, or GNOU, in Zoology. See CAPRA, n° xiii.

GOA, a large and strong town of Asia, in the peninsula on this side the Ganges, and on the Malabar coast. It was taken by the Portuguese in 1508, and is the chief town of all their settlements on this side the Cape of Good Hope. It stands in an island of the same name, about 12 miles in length, and six in breadth; and the city is built on the north side of it, having the conveniency of a fine salt-water river, capable of receiving ships of the greatest burden, where they lie within a mile of the town. The banks of the river are beautified with a great number of handsome structures; such as churches, castles, and gentlemens houses. The air within the town is unwholesome, for which reason it is not so well inhabited now as it was formerly. The viceroy's palace is a noble building; and stands at a small distance from the river, over one of the gates of the city, which leads to a spacious street, terminated by a beautiful church. This city contains a great number of handsome churches, convents, and cloisters, with a stately large hospital; all well endowed, and kept in good repair. The market-place takes up an acre of ground; and in the shops about it may be had the produce of Europe, China, Bengal, and other countries of less note. Every church has a set of bells, some of which are continually ringing. There are a great many Indian converts; but they generally retain some of their old customs, particularly they cannot be brought to eat beef. The clergy are very numerous, and illiterate; but the

Goat
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Goat.

churches are finely embellished, and have great numbers of images. In one of these churches, dedicated to Bon Jesus, is the chapel of St Francisco de Xavier, whose tomb it contains: this chapel is a most superb and magnificent place; the tomb of the saint is entirely of fine black marble, brought from Lisbon; on the four sides of it the principal actions of the life of the Saint are most elegantly carved in basso relievo; these represent his converting the different nations to the Catholic faith: the figures are done to the life, and most admirably executed: it extends to the top in a pyramidal form, which terminates with a coronet of mother-of-pearl. On the sides of this chapel are excellent paintings, done by Italian masters; the subjects chiefly from scripture. This tomb, and the chapel appertaining to it, must have cost an immense sum of money; the Portuguese justly esteem it the greatest rarity in the place. The houses are large, and make a fine shew; but within they are but poorly furnished. The inhabitants are contented with greens, fruits, and roots; which, with a little bread, rice, and fish, is their principal diet, though they have hogs and fowls in plenty. The river's mouth is defended by several forts and batteries, well planted with large cannon on both sides; and there are several other forts in different places.

Goa is the residence of a captain-general, who lives in great splendor. He is also commander in chief of all the Portuguese forces in the East Indies. They have here two regiments of European infantry, three legions of sepoy, three troops of native light horse, and a militia; in all about five thousand men. Goa is at present on the decline, and in little or no estimation with the country powers; indeed their bigotry and superstitious attachment to their faith is so general, that the inhabitants, formerly populous, are now reduced to a few thinly inhabited villages; the chief part of whom have been baptized: for they will not suffer any Mussulman or Gentoos to live within the precincts of the city; and these few are unable to carry on the husbandry or manufactures of the country. The court of Portugal is obliged to send out annually a very large sum of money, to defray the current expences of the government; which money is generally swallowed up by the convents and soldiery.

There was formerly an inquisition at this place, but it is now abolished; the building still remains, and by its black outside appears a fit emblem of the cruel and bloody transactions that passed within its walls! Provisions are to be had at this place in great plenty and perfection. E. Long. 74. O. N. Lat. 15. 31.

GOAL. See GAOL.

GOAT, in zoology. See CAPRA.

GOAT'S-Beard, in botany. See TRAGOPOGON.

GOAT-Sucker, in ornithology. See CAPRIMULGUS.

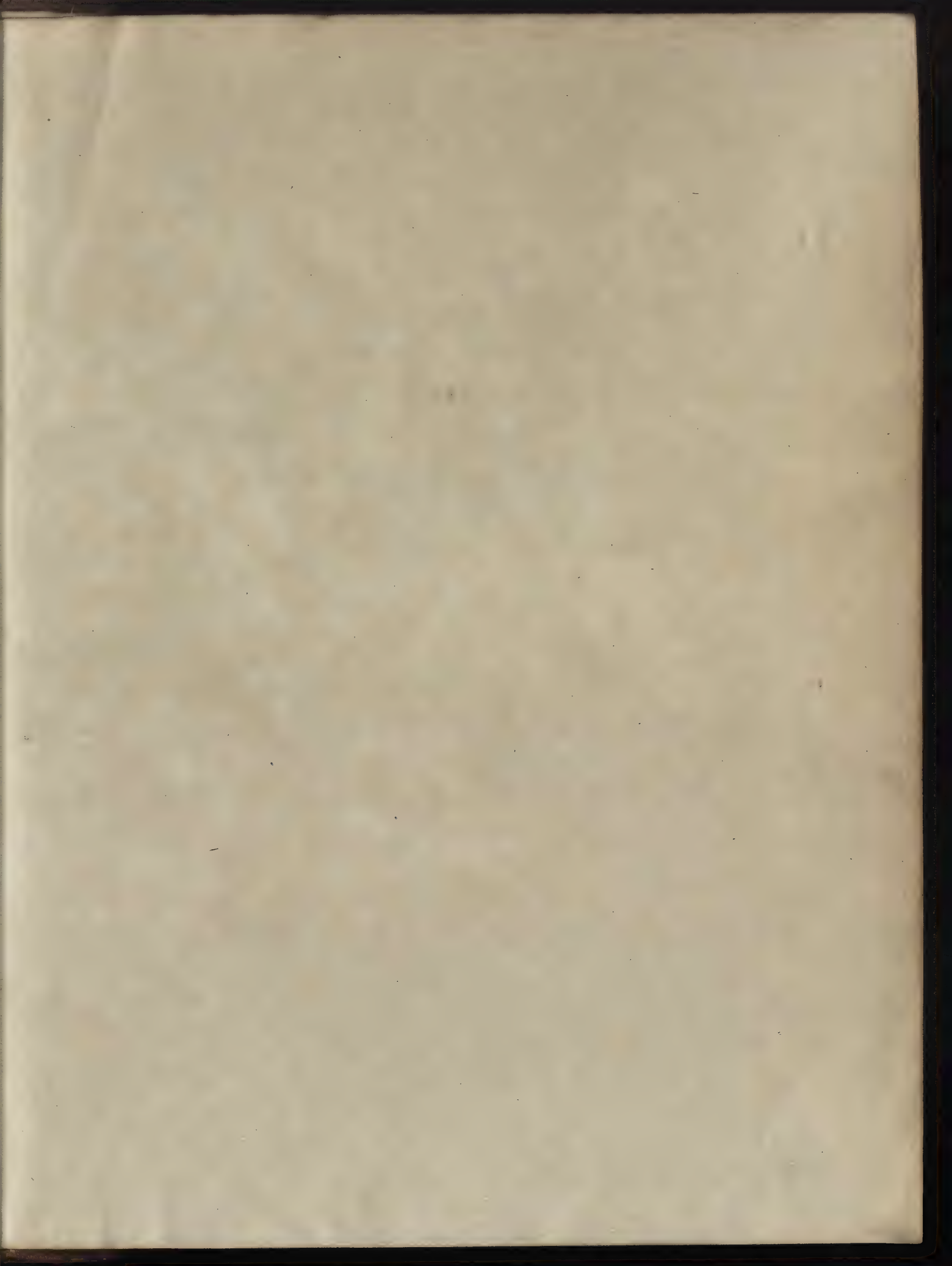
E R R A T A.

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CXCI.	-	192	CCIX. }	-	650
CXCII.	-	196	CCX. }	-	
CXCIII.	-	280	CCXI.	-	657
CXCIV.	-	292	CCXII. }	-	662
CXCV.	-	316	CCXIII. }	-	
CXCVI.	-	349	CCXIV. }	-	663
CXCVII.	-	364	CCXV.	-	
CXCVIII.	-	366	CCXVI.	-	668
CXCIX.	-	368	CCXVII.	-	672
CC. }	-	373	CCXVIII.	-	677
CCI. }	-		CCXIX.	-	696
			CCXX.	-	768
			CCXXI.	-	792

[In all, 38 Plates.]



2788-136 c.3

